THE MARINE REVIEW

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THE START

New Revenue Cutters

The Miami and Unalga Are Intended for Service in the Gulf and Alaskan Waters and Are Representative of the Latest Development in Vessels of this Type— The Revenue Cutter Service is an Important Arm of the Government

THE FINISH

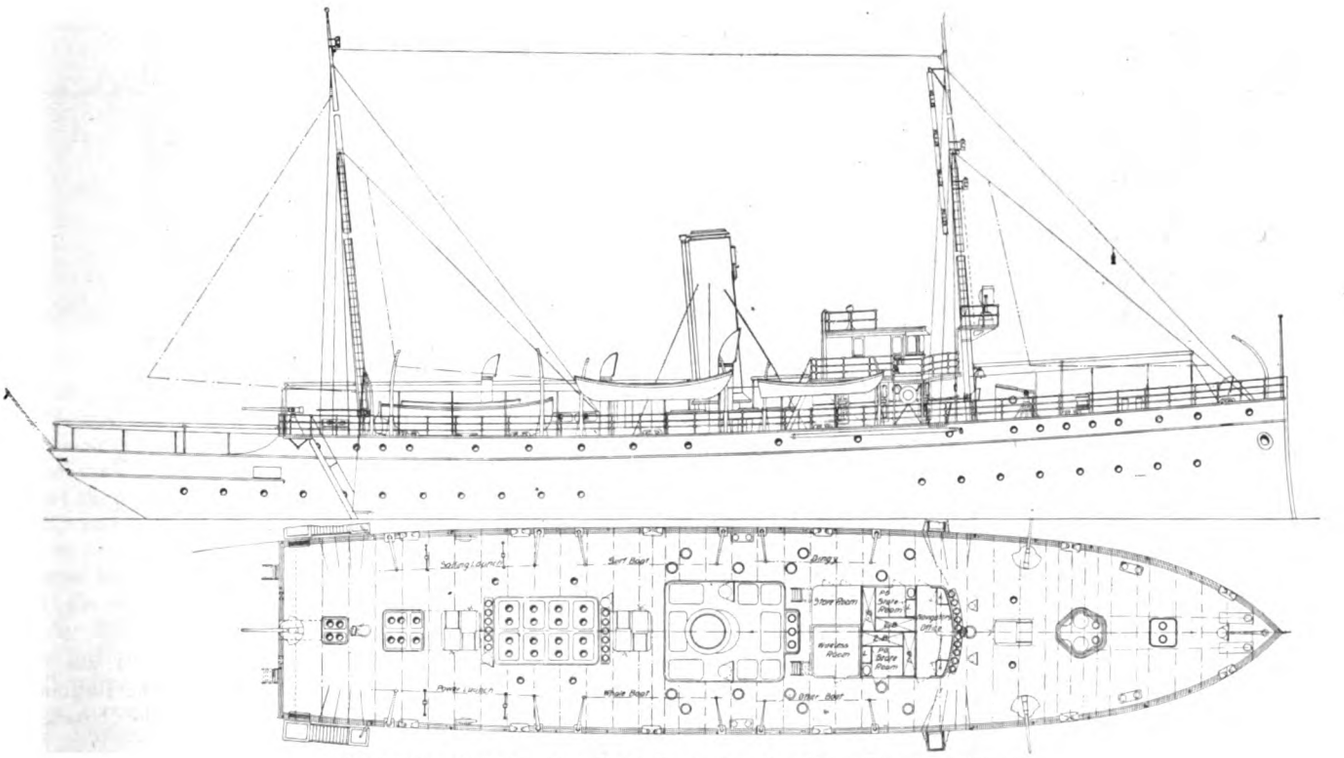
THE revenue cutters Miami and Unalga were launched from the yard of the Newport News Ship Building & Dry Dock Co., Newport News, Va., on Feb. 10. These vessels are duplicates and are 190 ft. long over all, 173 ft. 6 in. between perpendiculars, 32 ft. 6 in. beam and 17 ft. 6 in. deep, displacing at mean load draught 1,050 tons.

The vessels have a partial berth-deck forward and aft, a main deck extending the entire length of the vessel, and a three-quarter length spar deck, the latter being cut off aft for the purpose of installing towing-bitts for use when it becomes necessary to aid distressed vessels. They are constructed of mild open-hearth steel throughout, the joiner-work being plain but substantial. They are schooner-rigged with two pole masts, and a signal yard on the foremast.

The propelling machinery will consist of two water-tube boilers and one vertical, inverted, direct-acting, triple-expansion engine with cylinders 17 in., 27 in. and 44 in. in diameter, respectively, the common stroke being 30 in. There will be all the usual auxiliaries for a vessel of this class, including a powerful fire-and-wrecking pump with the necessary hose for pumping out other vessels in case of necessity. Her electrical installation will be very complete, including two dynamos, electric signalling apparatus, wireless telagraphy and a powerful searchlight.

The coal capacity of 250 tons and water supply of over 15,000 gallons will be sufficient to enable the vessel to keep at sea for long periods, a very desirable feature for a cutter destined for service on the Pacific.

In order to be of assistance to wrecked vessels a powerful wrecking



OUTBOARD PROFILE AND SPAR DECK OF THE NEW REVENUE CUTTERS

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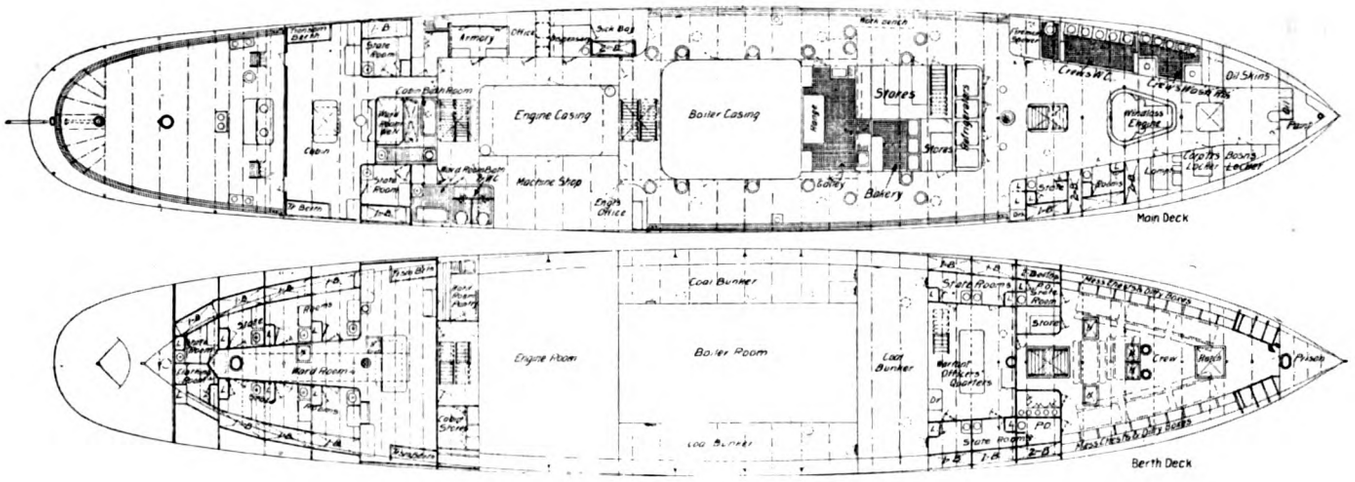
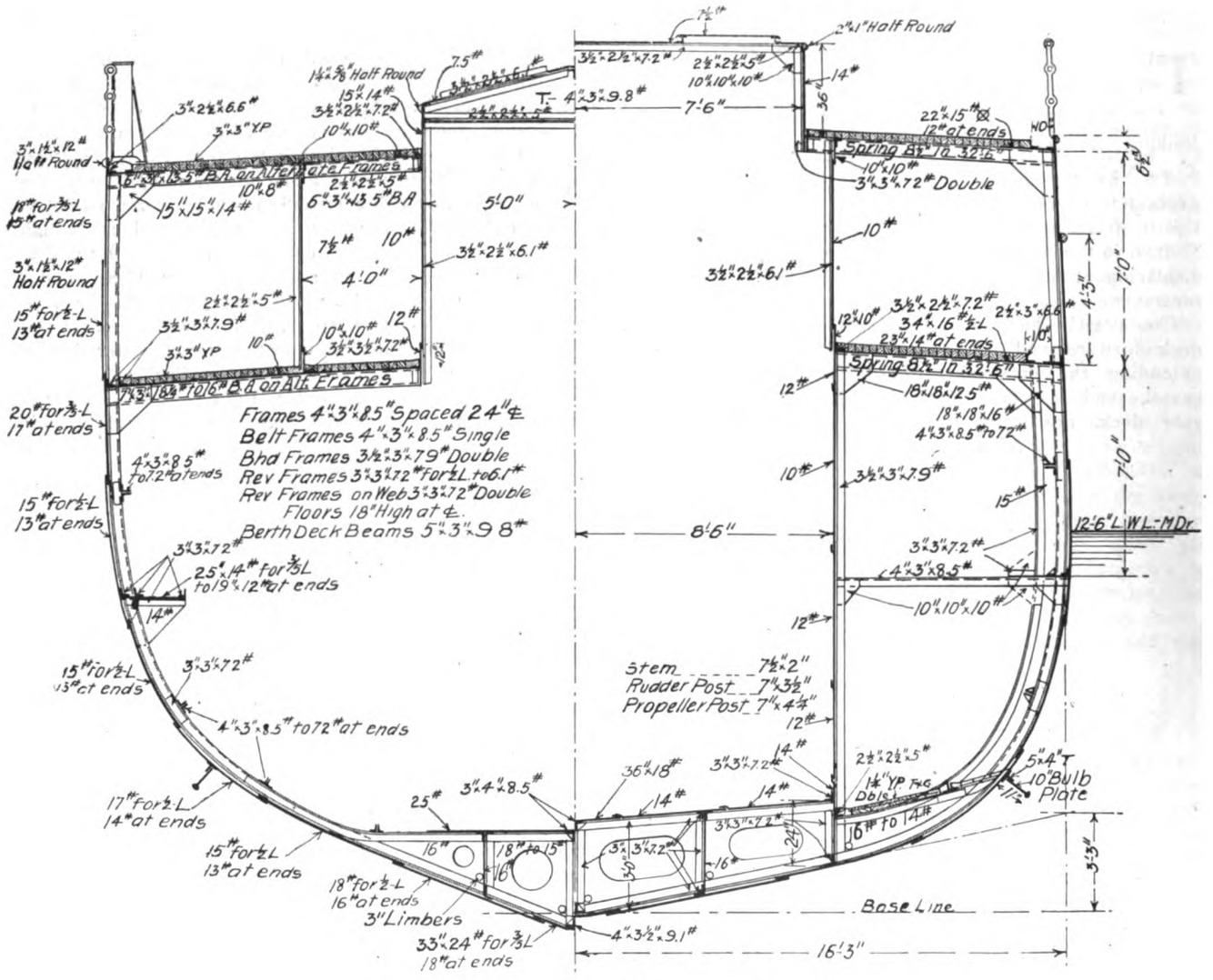


MAIN AND BERTH DECK PLANS OF THE NEW REVENUE CUTTERS



MIDSHIP SECTION OF THE NEW REVENUE CUTTERS

pump has been installed and furnished with sufficient suction hose to enable the cutter to pump out leaking vessels; the same pump can be utilized for fire purposes. The Unalga will be equipped with six small boats, including a surf-boat and a large power launch, as much of her work in Alaskan waters must be accomplished by means of the small boats. The Miami is to be stationed at Key West, Fla., and the Unalga in southeastern Alaska.

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Strathalbyn -- Virginian Collision

A Graphic Account of the Terrific Impact of Two Steamers in Pacific Waters

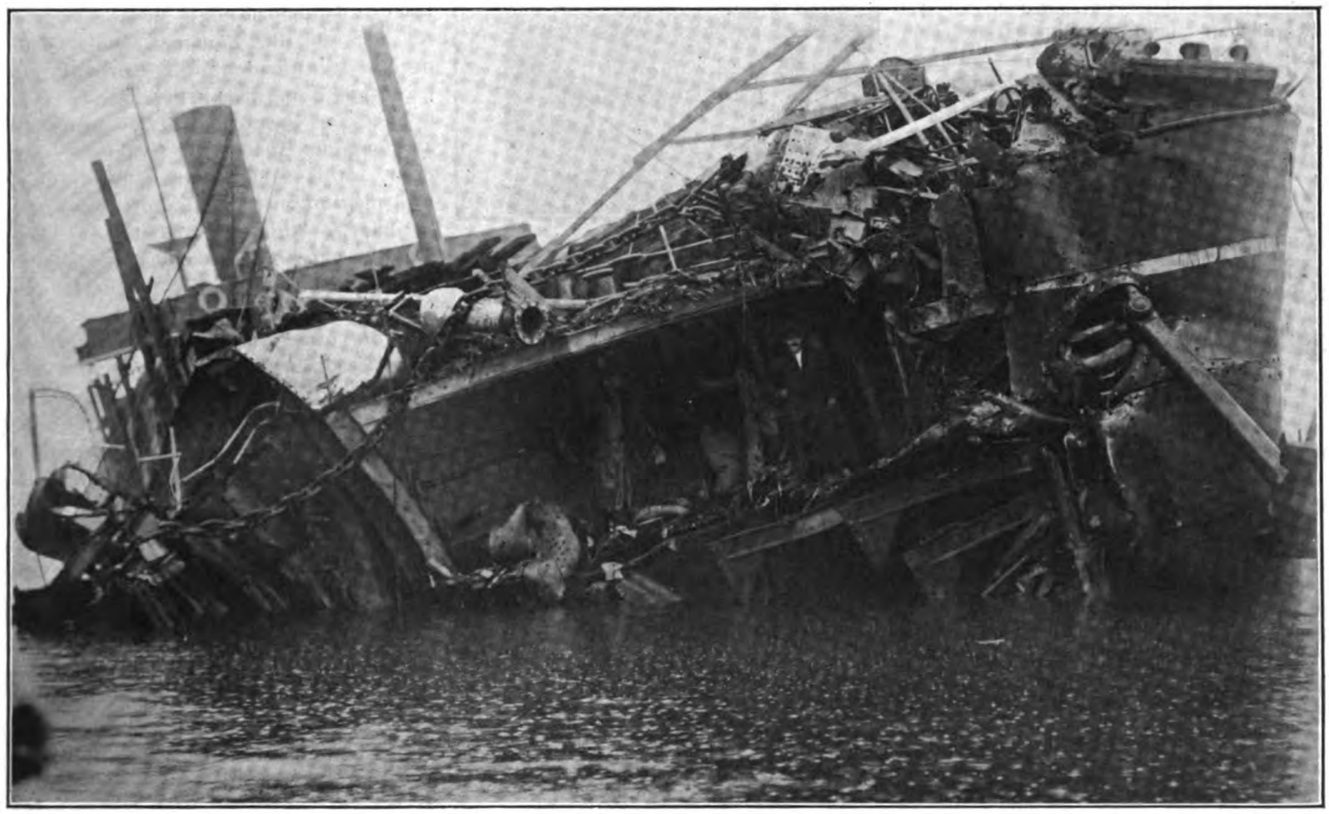
SEATTLE, March 6.—Not in years has so serious a collision occurred on the North Pacific as that between the American steamship Virginian, 5,077 net tons, and the British tramp steamer Strathalbyn, 3,602 net tons, on the night of Jan. 12. Off Three Tree Point, half way between Seattle and Tacoma, the huge steel steamers came together with a terrific crash, causing the death of one man aboard the Strathalbyn, and resulting in a property loss of approximately $100,000. The Virginian has just completed repairs and left for Salina Cruz, Mexico, while the Strathalbyn is at Esquimalt, B. C., in dock for repairs.

At the time of the accident, the Virginian, of the American-Hawaiian Steamship Co., was partly laden with general cargo for Honolulu and was proceeding to Tacoma from this port. The Strathalbyn, of the well known "Strath" fleet, owned by William Burrell & Son, of Glasgow and under charter to the American Trading Co., was proceeding to sea from Tacoma for Sydney, Australia, carrying 3,500,000 ft. of lumber. Both vessels were in charge of licensed Puget Sound pilots. The accident occurred about 8 o'clock in the evening, the weather being dark, but clear, a slight rain not obscuring the vision.

According to the stories of officers of each vessel, each took every possible precaution to avoid the mishap. Those on the American steamer assert that they did not see the Strathalbyn's lights until too late to avoid coming together. Officers of the British tramp admit that their electric lighting plant was out of commission, but they testified that range and side oil lamps, which were burning brightly, had been substituted and were sufficient for all purposes. They lay the blame on the Virginian, claiming that the officers on the latter vessel failed to answer the Strathalbyn's passing signals. Testimony has been given by officers and passengers of the passenger steamers Flyer and Indianapolis, which passed the two freighters shortly before the mishap. Their evidence is conflicting both as to lights and whistle signals.

Following the accident, the owners of the British tramp libeled the Virginian for $160,000, while the owners of the American vessel have asked the courts to award them $100,000 against the Strathalbyn. These damages are the largest asked in any Puget Sound court in marine suits in several years. The complaint of the Strathalbyn is of interest as giving one side of the controversy which is certain to be in the courts for many months and will likely develop into one of the most celebrated admiralty cases on this coast in years. It says in part:

"As soon as the steamer Flyer had passed, the Strathalbyn blew one blast of her whistle as a signal to the Virginian to pass her on the port side, both red and green side lights of the Virginian being at that time visible. The Virginian failed and neglected to answer the signal of the Strathalbyn and after proceeding for or in the neighborhood of a minute, the Strathalbyn again blew one blast of her whistle as a passing signal to the Virginian and the Virginian again failed and neglected to answer the same, the red light of the Virginian having theretofore closed and after giving such second passing whistle to the Virginian and receiving no answer and having ported the helm of the Strathalbyn her engines were stopped. That but a minute thereafter the Strathalbyn again sounded one blast of her whistle as a signal for the Virginian to pass her to port and the Virginian again failing and neglecting to answer said signal and her green light being the only one visible, the Strathalbyn backed full speed astern and sounded several blasts in quick succession as a danger signal to the Virginian and for the first time the Virginian sounded



BOW OF THE STRATHALBYN

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three blasts upon her whistle in answer thereto.

" * * * * the Virginian struck the Strathalbyn on her port bow in the vicinity of the hawse pipe and stove a hole in her and continued on through the Strathalbyn's bow and crumpled her plates and broke her frames from her stem back to and including some four or five frames abaft the collision bulkhead and thereby greatly bent and broke and damaged the whole forward portion of the Strathalbyn, including her windlass, forecastle and other parts of the forward part of said vessel and caused a loss of and damage to the large quantity of gear, machinery and property as well as injuring several of her crew and causing the death of one of them."

Notwithstanding their severe injuries, the masters of both vessels refused assistance and both proceeded to Tacoma, where the Virginian arrived three hours later and the Strathalbyn, seriously crippled and with No. 1 hold filled with water, stem almost submerged and a heavy list to starboard, five hours after the mishap. The Virginian was not badly injured and at Tacoma continued to work cargo. The Strathalbyn made fast to a buoy, but the next morning she began taking water at such an alarming rate that she was beached on the flats, where, as shown in the accompanying photograph, she appears like a total wreck. The lumber cargo was discharged from No. 1 and No. 2 holds, the water pumped out and when the vessel righted, it was seen that the damage did not extend below the water line. In this condition, she steamed from Tacoma to the Esquimalt dock at Victoria, B. C. It was found that when lying at the buoy with a serious list, water was pouring below through the ventilators, making beaching necessary.

Graphic Photo of the Wreck

The accompanying photographs tell an interesting story of the mishap. Incidentally they show how much worse the British steamer fared. The Virginian struck the Strathalbyn on the latter's port bow and the imprint of the British tramp's port anchor is easily seen on the starboard bow of the Virginian. The impact twisted the Strathalbyn's stem many feet to starboard and her port anchor can be discerned in the photograph about where the starboard anchor should be. The starboard side of the British vessel's forecastle was completely torn away, the plates being crumpled up for a distance of 10 ft. below the main deck back to 8 or 10 ft. into No. 1 hold. The wreckage hung overboard on the starboard side for 8 or 10 ft. beyond the side of the vessel and in this mass of crumpled plates and debris was found the body of the unfortunate British sailor who was killed. Until the wreckage was cleared away, he was thought to have been lost overboard. When the Strathalbyn steamed from Tacoma, this wreckage, weighing about 20 tons, was cut off and dropped into deep water. The photograph shows how the forecastle was laid open and how the starboard anchor and chain were pushed aft to almost abreast of the foremast. The Strathalbyn was the most curious spectacle of a collision victim seen hereabouts in years. It is estimated that repairs, which are being made by the British Columbia Marine Railways, will cost about $60,000.

BOW OF THE VIRGINIAN

The specifications for repairing the Virginian called for removing the stem from the upper deck to the first scarf, fairing and returning; renewing six plates on port side, removing and fairing two; five new plates on starboard bow, four to remove and fair and one to repair and fair in place; on port side two frames to fair in place and on starboard side three frames to renew and six to fair and replace. The two breast hooks were also faired. There was some damage below the waterline extending into the fuel oil tank in the forepeak. The injury on the starboard side included a rip about 12 ft. long and 10 to 12 in. in width above the oil tank. Above this, four plates were found punctured on starboard side. On the port side one plate was punctured and others bent. Compared with the Strathalbyn, the Virginian faired very well. All the bids for repairing the American steamer were rejected and finally the work went to the Seattle Construction & Drydock Co., on time and material. The time allowed was 18 days and the contract included drydocking at the Puget Sound navy yard, as no other dock on Puget Sound could accommodate the vessel. The steamer was returned to her owners within the time limit and the steamer has returned to service permanently repaired. At first the owners were inclined to make only temporary repairs here and dock the vessel at San Francisco, but the local firm made such an attractive offer that the entire contract was awarded here.

After taking considerable testimony in this case, the local board of United States steamboat inspectors have concluded that they have no jurisdiction in the matter. Pilotage is not compulsory for vessels under register on Puget Sound and pilots operating in these waters on vessels under register are subject only to the state inspectors. Consequently the federal inspectors have washed their hands of the matter and it is unlikely that the full details will be made public until the cases are threshed out in the courts.

Largest Ladder Dredge

William Simon & Co., Renfrew, Scotland, have recently completed the largest ladder dredge in the world for use on the Panama canal. The dredge is known as the Corozal. It is designed to discharge directly into hoppers or barges alongside and has a steaming speed of 10 knots per hour. It is to be capable of digging to a maximum of 55 ft. and is expected to have a digging capacity of 1,200 cu. yds. per hour. The dredge is provided with two sets of buckets, one with buckets 54 cu. ft. capacity each, and the other set with buckets of 34 cu. ft. capacity each. These buckets are made with cast steel backs and bodies of compressed plates of mild steel. The lips are of manganese steel forged to shape and afterward tempered.

Terminal at Panama

A committee has been appointed to consider a report on the facilities to be provided on the terminal docks for the Panama canal at Balboa and Cristobal for the convenient and economic loading and unloading of vessels. The work of the committee will include the arrangements of all tracks on wharves and piers and all matters connected with cranes and other cargo handling appliances. The committee consists of Col. H. F. Hodges, civil engineer, United States Navy, H. H. Rosseau, S. P. Williamson and J. A. Smith.

Dunlop, Bremner & Co., Port Glasgow, Scotland, have acquired the ship building plant of D. J. Dunlop & Co. Donald Bremner, who was associated with the Clyde Ship Building & Engineering Co., will be managing director. The engineering director is Thomas Payton, formerly with D. & W. Henderson & Co., Glasgow, and the ship building director is George G. Parker.

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Work in Coast Ship Yards

New York Ship Building Co.

The ship building program under construction at the yard of the New York Ship Building Co., Camden, N. J., includes the United States battleship Arkansas of 26,000 tons displacement, the battleship Oklahoma of 27,500 tons displacement, the Argentine battleship Moreno of 28,000 tons displacement; a Chinese cruiser, 328 ft. over all; the United States torpedo boat destroyer Jarvis, 294 ft. over all; the United States torpedo boat destroyer Downes, 305 ft. over all; three oil steamers, 342 ft. over all; one oil steamer, 407 ft. over all; two seagoing tugs, each 175 ft. over all; one sidewheel steamer, 410 ft. over all; one steam collier, 396 ft. over all, and one steam collier, 319 ft. over all.

Work at Newport News

The Newport News Ship Building & Dry Dock Co., Newport News, Va., has the following work under way:

Submarine boat Tuna of the Lake type for the United States Navy; torpedo boat destroyer Fanning for the United States Navy; battleship Texas for the United States Navy; revenue cutters Unalga and Miami for the Revenue Cutter Service; colliers Proteus and Nereus for the United States Navy; two bulk freighters of 3,500 gross tons register for A. H. Bull & Co., of New York, and one freight and passenger steamer of 6,000 gross tons register for the Clyde Line of New York.

Maryland Steel Co.

The Maryland Steel Co., Sparrow's Point, Md., has recently contracted to build two sidewheel passenger steamships for the Baltimore, Chesapeake & Atlantic Railway Co., Baltimore, Md., for service on Chesapeake Bay, having the following general particulars: Length over all, 200 ft.; beam molded, 36 ft.; beam over guards, 59 ft. 4¾ in.; depth molded, 11 ft. The engine will be double-cylinder, simple inclined with Corliss valve gear and two water leg type boilers.

Fore River Yard

The Fore River Ship Building Co., Quincy, Mass., have 12 vessels under construction at the present time, as follows: Battleship Rivadavia, battleship Nevada, torpedo boat destroyers Henley and Duncan, four Holland submarine boats, sulphur steamer Frieda, Standard Oil tank steamer, molasses steamer Nelson and a fireboat for Portland, Ore.

Harlan & Hollingsworth

The Harlan & Hollingsworth Corporation, Wilmington, Del., has a great deal of work on hand. The steamer for Olson & Mahony, San Francisco, has been sold to the Alaska Steamship Co., and renamed Cordova. Considerable alterations have been made on the vessel; the poop deck has been extended to bridge and sides of vessel built up, four additional staterooms added, and vessel arranged for special cargo. Her dimensions are 251 ft. long, 41 ft. beam and 20 ft. deep; gross tonnage, 2,400.

The sidewheel steamer Rose Standish has been built to the order of W. & A. Fletcher Co., of New York, for the Nantasket Beach Steamboat Co., of Boston. This vessel was delivered last month, with her boilers, uptakes and deck machinery installed, to the Fletcher company, who will finish her at New York. Her dimensions are 311 ft. overall, 34 ft. molded beam, 59 ft. over guards, and 12 ft. 6 in. deep.

The freight steamer Henry Williams, building for the Baltimore & Carolina Steamship Co., has three complete decks, and is built to Lloyds' highest class. She is 241 ft. long, 39 ft. beam and 28 ft. deep.

The Harlan & Hollingsworth Corporation has contracts for the following:

Two fishing steamers, the B. H. B. Hubbard and W. T. James, for the Taft Fish Co. These vessels are 155 ft. long, 23 ft. beam and 11 ft. depth of hold, and hulls are built of wood.

One fishing steamer, the Warren J. Courtney, for the C. E. Davis Packing Co., of same dimensions as above, also a wood hull.

One fishing steamer for the Atlantic Fisheries Co., 155 ft. by 24 ft. by 10 ft. The hull is of wood.

The hulls for these four vessels are being built by the Jackson & Sharp Co. (American Car & Foundry Co.), of Wilmington, Del., while Harlan & Hollingsworth build the engines, boilers, tanks, and install same, together with all equipment ready for service.

This company has machinery constructing and equipment being prepared for two fishing steamers for the Lewes Fisheries Co., and for one steamer for the Edwards Fish Co.

The following contracts have been received this year:

One single-screw passenger and lumber steamer for Wilson Bros. Co., to be named Columbia. The dimensions are 251 ft. over all, 243 ft. 3 in. perpendiculars, 41 ft. beam, and 20 ft. deep. The machinery is located aft, and consists of two cylindrical return-tube boilers, 12 ft. diameter and 11 ft. 5 in. long, and a triple expansion engine having cylinders 19 in., 30 in. and 50 in. diameter by 36-in. stroke. The vessel has two masts, each equipped with two booms and two hoisting engines for rapidly discharging cargo.

One single-screw freight steamer for the Union Co., to be named the John A. Hooper. This vessel is about 300 ft. long overall, 284 ft. perpendiculars, 44 ft. beam and 21 ft. 6 in. deep. The machinery located aft consists of two cylindrical return tube boilers, each 14 ft. 3 in. diameter by 11 ft. 9 in. long, and a triple expansion engine having cylinders 21 in., 34 in. and 56 in. diameter by 42-in. stroke. This vessel has three masts, eight cargo booms and is equipped with powerful hoisters for discharging cargo rapidly.

One steel lighter for the Central Railroad of New Jersey, to be named Mauch Chunk. This vessel is 118 ft. long overall, 105 ft. 7 in. perpendiculars, 31 ft. 6 in. beam molded, 12 ft. 9 in. deep. She is equipped with a single engine 22 in. diameter and 26-in. stroke, and one boiler 13 ft. 6 in. diameter and 12 ft. 3 in. long. This vessel has a steel mast and large steel boom with rigging for handling heavy boilers, etc. The hoisters are of special construction and operated by one man.

One steel sea-going tug for the Philadelphia & Reading railroad to be named Germantown. This vessel is 170 ft. long overall, 163 ft. 6 in. perpendiculars, 30 ft. beam molded and 18 ft. deep. She is schooner rigged and is similar in appearance to the other large tugs of the company. Her machinery consists of two return tube boilers 12 ft. 6 in. diameter and 12 ft. 7 in. long, and a triple expansion engine 18 in., 28 in. and 45 in. diameter by 30-in. stroke.

One steel passenger and freight steamer for Olson & Mahony, San Francisco, to be named California, to replace the vessel built for them and sold to the Alaska Steamship Co.

The tug Germantown and all the lumber steamers are equipped with powerful towing engines of Shaw & Spiegle design.

The steamer Nicholas Cuneo is in dry dock having new rudder fitted,

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shafting overhauled and undergoing general repairs.

The Wobun is having her tail shaft removed and undergoing a survey.

The tugs Emily and Meteor have had new propellers fitted.

The passenger steamer Ulrica is undergoing a survey.

Skinner Ship Building Co.

The Skinner Ship Building & Dry Dock Co., Baltimore, Md., are at present engaged on the following work: One leg boiler for the Baltimore & Ohio Railroad Co.'s tug Transfer; one steel tug boat for the Hartford & New York Transportation Co., length on deck 115 ft., beam moulded 25 ft., depth from top of keel to top of beams at sides and shallowest place 11 ft. 9 in.; one covered lighter for the Chesapeake Lighterage & Towing Co., 90 x 28 x 8 ft., a duplicate of one just finished for them; Norwegian steamship Nordhvalen docked, new tail shaft and propeller installed, all bearings opened up, crank pin brasses remetaled, making new propeller, etc.; Norwegian steamship Sif docked, cleaned and painted bottom, removed propeller and tail shaft for examination, stern bearing rewooded, rudder pintles rebushed and machinery overhauled; Norwegian steamship Katie docked, new stern post gudgeon, bushing rudder pintles, renewing shell rivets and new rudder chains; Norwegian steamship Terje Viken, retubing donkey boiler; changing sterns and installing new stern frames in two oil barges; completing extensive repairs and renewals; new boilers, oil engine and air compressor plant installed on United States light vessel No. 52; retubing condenser and making new crank pin for engine for one of B. & O. elevators; laying new sheathing on deck of steamer Three Rivers; making new fresh water tanks for Consolidation Coal Co.; steamer Columbia, making machinery repairs and retubing boilers.

Seattle Construction Co.

The Seattle Construction & Dry Dock Co., Seattle, Wash., is making extensive repairs to the steamship Victoria, of the Alaska Steamship Co., including the building and installing of two double-ended Scotch marine boilers, 14 ft. diameter by 17 ft. 4 in. long; one donkey boiler, 8 ft. 9 in. diameter, and 9 ft. long, with all copper pipe connections; building fuel oil tanks and installing oil-burning system in the new boilers; building social hall and furnishing dining-room and increasing somewhat the passenger accommodations of the vessel.

The ship yard is also adding an awning deck on the steamer La Touche, of the Alaska Steamship Co.'s fleet, greatly increasing her cargo carrying capacity.

They are also building and installing molasses tanks and increasing the oil carrying capacity of the steamer Hyades, of the Matson Navigation Co.'s fleet.

Repairs are also being made to the bow plating and frames of the steamship Virginian, of the American-Hawaiian Steamship Co.'s fleet, which was recently damaged in collision with the British steamer Strathalbyn on Puget Sound.

They are also installing fuel oil burning apparatus on the steamer Princess Adelaide, of the Canadian Pacific Line. The army transport Dix is also undergoing considerable repairs in the engineering and deck departments and new furnaces are being installed on the steamer Indianapolis. The company recently cast in its own foundry a new cylinder, weighing nearly 15 tons, for the steamer City of Pueblo, of the Pacific Coast Steamship Co.'s fleet. The cylinder is 43 in. diameter and 60 in. stroke.

General Repair Work

The Perth Amboy Dry Dock Co., Perth Amboy, N. J., has during the past few weeks hauled out and made general repairs to schooners Eagle Wing, Herald, Pendleton Sisters, Perry Setzer, Bessie Whiting, Ann Louisa Lockwood, and Blanche H. King; barges Doris and Atlas Portland Cement Co. No. 7; steamer Robert W. Johnson and boat W. H. Brown; and minor repairs to the schooners F. & T. Lupton, Charles H. Sprague, Elizabeth Gilbert, and Humarock; barges L. S. Storrs, Fannie Preston, Josephine, and Nathan Lawrence; boats Violet Blossom, Warren Huber, and James Brown; steamer Ashfield, and tug William Schaubel Sr.

The U. S. dredge Sabine will go from Sabine Pass to the Weaver & Son ship yard at Orange, Tex., for alteration and repairs costing $40,000 or more. The dredge will be the first vessel hauled out on the set of new ways just completed by Weaver & Son.

The Alaska Steamship Co.'s recently purchased steamer, Mariposa, is having structural and other alterations made at Seattle to fit her for use in northern waters. Alterations will be made to her cabin doors, which will be rehung to open aft instead of forward. In addition to having doors rehung, the Mariposa's hatches will be enlarged to facilitate movement of ore cargoes, which this season are expected to play a highly important part in Alaska trade. Also more staterooms are to be added aft.

The Commercial Boiler Works, Seattle, Wash., have received an order from J. F. Duthie & Co. for a Scotch marine boiler, to be installed in a steel fishing vessel being built by the latter company for the San Juan Fishing & Packing Co. Diameter of boiler, 13 ft.; length, 11 ft. 6 in.; three Morison suspension furnaces; internal diameter, 38½ in., and 272 3-in. dia. steel tubes, which is to be built for a working pressure of 180 lbs. The oil fuel tanks are at present being installed in the steamer M. F. Plant at the Commercial Boiler Works and when these are in place, her new boilers will be installed. The M. F. Plant, in addition to this work, is having a forecastle deck and new bulwarks aft built at this plant. Work on the new hatches and boiler foundations on the steamer Amur is progressing satisfactorily. The boiler for the cannery tug A. B. Carpenter and the boilers for the cannery vessel W. H. Smith are ready for installation and the boiler for the North Star is approaching completion. The Commercial Boiler Works are busy with 18 steel cone liners, 9 ft. diameter, for the Puget Sound Bridge & Dredging Co., and they are making good progress with the steel pipe line for the city of Seattle.

The halibut schooner Sophia Johnson has been on the Elliott Bay Dry Dock Co.'s dock for cleaning, painting and general repairs, and the Sound passenger steamer Puget was hauled out, removing old propeller and installing new one.

The Seaford Marine Railway Co., Seaford, Del., are building a new 175-ft. barge for Capt. W. H. Williams, of Bethel, Del., and are making alterations and repairs on three fishing steamers for the Menhaden Oil & Guano Co. The steamers Hanna A. Lennen and Alden S. Swan are to be straightened, refastened and cabled all over, the after-house raised and quarter decks and rail put all around and extra clamps and new main and bilge keelson put in. The steamer Samuel S. Brown is to be caulked, painted and slight repairs made. The yacht Elmer Connaway is having her engines installed at this yard.

The Northwestern Fisheries Co.'s new cannery tug A. B. Carpenter was launched from Hall Bros.' ship building yards at Winslow, Wash., Feb. 8. The A. B. Carpenter is designed to be one of the staunchest and fastest of the Alaskan cannery tug fleet, and is 110 ft. long, 23 ft. beam and 10 ft. deep, equipped with 300-h. p. engines and Scotch boilers, giving her a speed of 10 knots.

New Ship Construction

Kruze & Banks, Marshfield, Ore., laid the keel, on Feb. 3, for the steamer they are to build for the Estabrook Co., of San Francisco. The new vessel will be 200 by 42 by 11 ft., and will run in the San Francisco-Coquille River trade.

The San Juan Fishing Co. has con-

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tracted with J. F. Duthie & Co., of Seattle, for a fishing vessel, 140 by 25 by 13½ ft., capable of making a speed of 12 knots an hour. She will be one of the ablest fishing craft on the west coast and will be completed about June 1. The Duthie yard is a new one, and besides this vessel is building two whalers for the Alaska Whaling Co.

The Coastwise Transportation Co., of Boston, has contracted with the New York Ship Building Co., Camden, for a fourth collier to have a carrying capacity of 7,200 tons. The new vessel is to run in conjunction with the Coastwise, Transportation and Suffolk, and will be ready for delivery next August.

The Craig Ship Building Co., Long Beach, are rushing the work on the new pleasure steamer they are building for the Southwestern Navigation Co. She is to be 210 ft. long, passenger capacity of 2,500, and will cost $20,000. The steamer will make three trips daily between Santa Monica, San Pedro and Newport.

The Hart Wood Lumber Co., of Aberdeen, Wash., has contracted with the Matthews Ship Building Co. of Hoquiam for a steamer capable of carrying about 800,000 ft. of lumber and accommodating 27 passengers. This vessel will be equipped with two Babcock & Wilcox boilers, have a speed of 10½ knots an hour, and cost about $130,000.

The C. A. Smith Lumber & Mfg. Co., Marshfield, Ore., which owns and operates two steamers, the Nann Smith and Redondo, are planning to have constructed another steamer similar to the Nann Smith. It will be about 296 ft. in length, with 18 in. more beam than the Nann Smith, and will carry slightly more lumber. Plans for the vessel are now in the hands of ship builders.

Work on a big barge for P. Doherty & Co., of Baltimore, will shortly be commenced at the Kelley-Spear Co. yard at Bath. The craft will be 215 ft. long on keel, 40 ft. beam, 14 ft. 6 in. deep, and will have a carrying capacity of about 2,000 tons. Two barges for the Staples Transportation Co. are already under construction at the same yard.

The Rowe Bros. Co. has given a contract to the Kelley-Spear Co., of Bath, for the building of a new steam lighter, which will be the largest and most efficient of the kind on the New England coast. The new craft, which is to be ready for delivery May 1, will measure 145 ft. in length, 35 ft. beam and 13 ft. depth of hold, and will have a carrying capacity of 800 tons. Two fore and aft compound engines of 700 h. p. will be installed on the new lighter.

The Atlantic Fertilizer & Oil Co., of New York, are building three pogy steamers at the Cobb-Butler yard, Rockland, Me., the engines for which will be supplied by the Portland Co., Portland, Me.

The Mallory Line is having plans drawn for a steamer to come out in 1913.

The Matson Navigation Co. are preparing plans for a steamer to have twice the passenger accommodations of the Wilhelmina and to carry about 6,000 tons of sugar.

The Seattle Construction & Dry Dock Co., Seattle, Wash., has received contract for a steel passenger steamer, to be known as the Potlatch, for the Inland Navigation Co. The new steamer will be 180 ft. long over all, with gross tonnage of about 570 tons. She will have triple-expansion engines and two Seabury water-tube boilers. This company has also recently received contract for four submarine torpedo boats for the United States government and two submarine torpedo boats for the Chilean government.

The Standard Oil Co. is having a 130-ft. barge built by Nelson & Kelez, Seattle, to be used in conveying oil fuel to steamers while loading at docks in Seattle harbor.

The Union Sulphur Co. has contracted with the Fore River Ship Building Co., Quincy, for a single-screw steamer, 300 ft. long, to cost $400,000 and to operate between this and Mexican ports. The new vessel will be of the self-trimming type, capable of discharging cargoes at the rate of over 300 tons per hour.

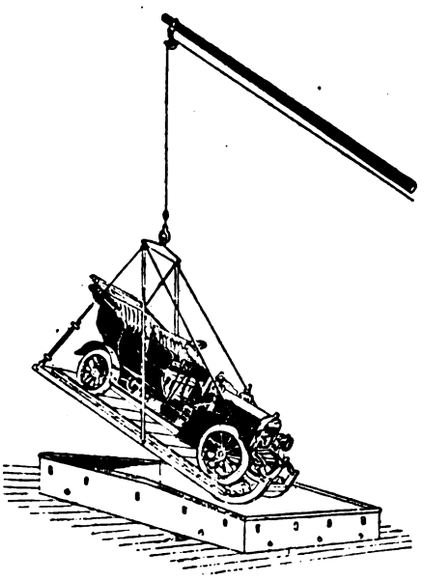
Bids for Gunboat

No bids acceptable were received by the navy department for constructing one gunboat authorized by congress at the last session because the cost, exclusive of armor and armament, was not to exceed $500,000. The New York Ship Building Co. submitted a letter stating that the vessel could not be built within the appropriation and that a fair price for a vessel in accordance with departmental plans would be $735,000. William Cramp & Sons submitted three proposals: One for a vessel in accordance with departmental plans, speed 16 knots, for $716,000; a second on departmental plans but with a different electric plant, $723,000; and a third for a gunboat of 1,300 tons displacement with speed of 14 knots for $485,000. This is 400 tons less displacement than the gunboat calls for.

Jacob Ullman, of Buffalo, has purchased the plant of the Empire Ship Building Co., of Buffalo, at public auction for $6,500. The plant was appraised at $12,907.64.

Loading Motor Car Aboard Ship

The North German steamer Grosser Kurfuerst recently carried 70 motor cars from Germany to Southampton, in conjunction with the tour of the German Automobile Club through Great Britain. The accompanying sketch shows how the cars were transferred on board the steamer. The device consisted of a platform having an angle bar at each side, the bars being turned up at one end. The platform was slung from a hinged cross piece, supported by adjustable wire rope stays so that the angle of lifting could be altered to suit the size of the car and the size of the hatch through which the car had to be lowered. The cars were in turn driven onto this platform, a wood cleat with sand bag being provided at the curved end to protect the pneumatic tires. To prevent any side movement of the cars, wood cleats were fixed to the platform outside the wheels. The work of loading occupied about six hours. The stowage of the cars in the holds and 'tween decks presented no difficulty. When standing on a wood deck they were kept in place by wood cleats fixed to the deck, and when standing on the iron deck they were prevented from moving by the use of sand bags placed against the wheels.



HOISTING MOTOR CARS

The Toledo Ship Building Co., Toledo, O., has closed contract for two steamships full canal size for Atlantic coast parties. The steamers will be delivered in August and October of the present year.

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Fitting-Out in Lake Yards

Remodeling the Castalia

The steamer Castalia, owned by the Brown Steamship Co., Perry-Payne building, Cleveland, is undergoing extensive alterations. The old wooden deck houses are being entirely removed and new steel decks fitted where old houses stood. The forecastle deck is being extended aft about 8 ft. and new steel Texas and pilot houses are being built on this new forecastle deck, with new steel bulwarks around the forecastle. The three forward hatches are being rebuilt, making them 12 ft. center hatches and arches are being fitted between these new hatches. The stanchions and beams through the cargo hold are being removed and a new system of trusses known as Herriman's system is being introduced. When the work is completed the hold will be entirely free from any obstruction, making her equal as far as strength and ease of operation are concerned, to modern arch construction vessels, and her general appearance throughout will be that of a thoroughly modern steamer.

Victory's New Boilers

The Manitowoc Ship Building & Dry Dock Co., Manitowoc, Wis., are installing two new boilers, 13 ft. 6 in. by 11 ft. 6 in., allowed 180 lbs. pressure in the steamer Victory, belonging to Pickands, Mather & Co.'s fleet. These boilers are being placed on the tank top instead of on the boiler deck, as was previously the case, and this necessitates the tearing out of the boiler deck and putting in new athwartship coal bunkers together with ventilators and new piping. The company is also removing the old boiler and installing a new one in the steamer Samuel Mather (small), of the Pittsburgh Steamship Co.'s fleet. The new boiler will be 13 ft. 9 in. diameter and 11 ft. 6 in. long, allowed 160 lbs. pressure. This work necessitates shifting of the athwartship coal bunker bulkheads and putting in new piping and ventilators. The steamer Marion, of the Michigan, Indiana & Illinois Line of Chicago, is undergoing extensive rebuilding at this yard in addition to the installation of one fire box boiler, 12 ft. in diameter and 15 ft. long, allowed 135 lbs. steam pressure. The company is also putting in a new boiler pan and a new steel boiler house.

Detroit & Buffalo Line Changes

The Detroit & Buffalo Navigation Co. are putting in new composition floors in the galleys of the steamers Eastern States and Western States. The City of Alpena, too, is being equipped with water-trimmed tanks, doing away with the old-fashioned sand barrel ballast. Six new parlors will be installed on the City of Detroit II. Rapid progress is being made on the new steamer City of Detroit III, and it is expected that she will undergo a trial trip about May 15. The company has made application for changing the names of some of its steamers as follows: City of Alpena to City of Alpena II, City of Mackinac to City of Mackinac II, City of Detroit to City of Detroit II, City of Cleveland to City of Cleveland III.

Union Steamboat Line

All the steamers of the Union Steamboat Line (Erie railroad) are being given a thorough overhauling and extensive improvements in line with the policy of the Erie to establish and maintain its physical equipment in the best possible condition. Much was done in this direction last year, but the scope of improvements has been much broadened for 1912.

The Owego is receiving new boilers and extensive machinery alterations at Cleveland.

The Underwood and Tioga are undergoing modifications at Chicago. The latter ship, it will be remembered, made a remarkable record last year as a result of the improvements inaugurated during the winter of 1910-11 and a further improvement is looked for.

The Starrucca, Richardson, McCullough, Binghamton and Chemung are receiving extensive machinery and boiler alterations at Buffalo. The Binghamton is receiving new houses throughout, new spar deck, and her bunker arrangement is being atlered to give about 120 tons additional cargo space.

Plans have been prepared for new boiler installations in the Starrucca and Chemung which, however, will not be carried out until next winter. All the ships of the fleet have been fitted with wire mooring machines.

The electric wiring throughout has been torn out and the ships rewired on the most modern system. The old engine type generators have been removed and new and larger (Terry) turbo-generator units installed. New switchboards have been fitted in several of the ships.

The Line has added a steam fuel lighter and dock accessories to its equipment and will hereafter handle its own fuel coal.

As a result of the improvements authorized and under way, the management look for a large improvement in economy of operation and a substantial increase in the efficiency and capacity of the fleet.

Northern Navigation Co.

The Northern Navigation Co., Ltd., Collingwood, Ont., have made some improvements in the steamers Majestic, Germanic and City of Midland. On all of these steamers electric push buttons have been installed in all staterooms and other parts of the vessels, and they will be provided with annunciators and bell boys to look after the requirements of guests. The company is also putting in running water on the steamers Germanic and City of Midland, which will make considerable improvement on these two boats, and in addition is installing a new pantry and new lavatories on the steamer City of Midland. Alterations and improvements on the hull and machinery of the steamer Huronic are also being made.

Changing to Arch Construction

The steamers M. A. Hanna and H. S. Holden, owned by Capt. John Mitchell, of Cleveland, are being modernized at the yard of the Toledo Ship Building Co., Toledo. The tank top plating on these steamers has been removed and the tank stiffeners trebled; water bottom scraped and painted; upper deck removed and ships changed to arch construction; 22 hatches put in, 12 ft. centers, with high steel plate hatch coamings with steel hatch covers; mooring engines put in for handling the wire lines. Other vessels at the Toledo yard are the steamer J. B. Neilson, receiving new boilers and other alterations and repairs; the passenger steamer Arrow for the installation of new boilers; and the steamers J. P. Morgan and Widener for docking and for examination of the bottom.

McMyler Derrick on Lighter

The Donnelly Salvage & Wrecking Co., Ltd., Kingston, Ont., have placed a five-ton McMyler derrick with a yard and a half clamshell on their 700-ton lighter Grantham. They have also placed two specially constructed pulling machines in the wrecking steamer Saginaw, each machine having 2,000 ft. of 1½-in. flexible steel cable, capable of pulling 100 tons each on a single wire. This is considered the most powerful pulling machine on any wrecking tug on the great

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lakes and will be of great service to vessels stranded in the currents in the St. Lawrence river where it is impossible to get room for large tug power. There will also be two three-ton anchors on board at all times.

Inland Lines, Ltd.

The Inland Lines, Ltd., Midland, Ont., are doing considerable repair work on their fleet this winter. The between deck beams of the steamer Midland King are being moved so as to make it handier for unloading purposes. The steamer Dundurn is being equipped with a new steam steering gear and considerable repair work is being done on the hull of the steamer Rosedale, including the taking off, re-rolling and replacing of 20 plates which were damaged in the St. Lawrence canal during the past season. The balance of the fleet is undergoing the usual fitting-out repairs.

Algoma Central Line

The steamer Paliki, belonging to the Algoma Central Steamship Line, Sault Ste. Marie, Ont., is at the yard of the Collingwood Ship Building Co., Collingwood, Ont., where the two Scotch boilers now in the steamer are about to be replaced with one Scotch boiler. 15 ft. 6 in. by 10 ft. 6 in., with three furnaces, each 47 in. diameter. The company is also bushing the high-pressure cylinder of the engine changed from 19⅛ in. to 17 in., and the new boilers will carry 180 lb. of steam instead of 160 lb. pressure carried on the old boilers.

Lengthening the Islander

Several of the steamers of the Arnold Transit Co., Mackinac Island, Mich., are undergoing repairs. The Islander is being lengthened 24 ft. and a new boiler is being installed in her. A new boiler is also being installed in the Eugene C. Hart, which is larger than the old one, and her speed will be increased 2 miles per hour. The Elva is at the plant of Hickler Bros., Sault Ste. Marie, where she is receiving new planking. The steamers Chippewa, Mackinac and Columbia are also receiving minor repairs and improvements.

Enlarging Hatches

The steamer Harvey H. Brown, of the Northwestern Transportation Co.'s fleet, is undergoing repairs to her coal bunkers and bulkheads. Her hatches are being enlarged and new covers provided. She will also have an entirely new concrete reinforced floor in the hold. The steamer S. R. Kirby, of this same fleet, has also undergone some changes. Her tanks underneath the decks were taken out and the necessary strengtheners put in, and other necessary work was done to put her in first class condition. The taking out of the tanks underneath her decks has increased her carrying capacity about 400 tons.

Goodrich Transit Co.

The Goodrich Transit Co., Chicago, will, during the coming season, operate a steamer from Chicago to the Sault, down north channel to Georgian Bay and through Georgian Bay proper. To this end it is making extensive alterations on the steamer Arizona. This steamer is now at the yard of the Manitowoc Ship Building & Dry Dock Co., and will be equipped for taking care of passengers on long trips. A large dining room will be installed in the main cabin forward, extending from side to side of the ship, giving an unobstructed view from practically every portion of the dining room. Some large rooms with bath will be added, as well as public baths for men and women, for which no charge will be made. A third tier of staterooms is being added, which will increase the steamer's sleeping capacity quite materially.

General Fit-Out Work

The Cleveland & Buffalo Transit Co., Cleveland, is spending a large sum of money on the steamer City of Buffalo and also on the steamer City of Erie in captain's, engineers' and stewards' departments, it being the purpose of the company to bring these two steamers up to the highest standard in order that they may be operated side by side with the new $1,500,000 steamer which this company will bring out in 1913.

The steamer Garden City, of the Niagara, St. Catherines & Toronto Navigation Co.'s fleet, has been equipped with new boilers. Capt. George Blanchard will be in command of the steamer and H. R. Welch will be her chief engineer. The steamer will go into service on or about May 24.

The steamer Senator Derbyshire, of the Brockville Transportation Co.'s fleet, Brockville, Ont., is undergoing general repairs, such as hatch coamings, deck, caulking, etc., as well as extensive repairs on boiler and engine. The company is also enlarging the hatches of the barge F. A. Georger, putting in new planks where required, repairing the deck, recaulking the barge all over and making other needed repairs.

The steamer George Burnham, of the Naugle Pole & Tie Co.'s fleet, is undergoing minor machinery repairs and will probably get a new oak deck.

The Central Canada Coal Co. is making general repairs on the hull of the steamer Samuel Marshall, such as hatch coamings and deck caulking, etc. Her engine, winches and hoisting engines will also be put in first class shape.

The fleet of the Ogdensburg Coal & Towing Co., Ogdensburg, N. Y., is undergoing general repairs on hulls, boilers and engines. A considerable quantity of oak and pine decking is being used in making repairs.

The steamer Frank E. Kirby, of the Ashley & Dustin Line, has gone through the usual repairs to bulwarks, decks, boiler and overhauling of machinery.

The Pittsburgh Steamship Co. is making the usual fitting-out of the fleet. The steamers Neilson and Samuel Mather are having new boilers installed in them, the former at the yard of the Toledo Ship Building Co., Toledo, and the latter at the yard of the Manitowoc Ship Building & Dry Dock Co., Manitowoc, Wis. Six of the older first class steamers will be fitted with enclosed pilot houses.

The Quebec Transportation & Forwarding Co., Ltd., Quebec, is building at Quebec a new tug, 110 ft. long, 23 ft. wide and 10 ft. 6 in. deep, equipped with a fore and aft compound surface condensing engine with cylinders 20 x 40 in. diameters and 30 in. stroke. The tug Florence, belonging to this fleet, is also being fitted with a new boiler.

The Peninsula Tug & Towing Co., Wiarton, Ont., are having two new sides put in the fire box of the boiler of the tug Crawford and also a new inside head.

Karr & Mitchell, Cleveland, are having the two after hatches of the barge Donaldson enlarged to the size of 9 x 15, with new coamings and covers. Floor ceiling will be repaired with 2-in. oak planking.

New wooden cabins are being fitted on the steamer Northern Light of the Mutual Transit Co.'s fleet at the yard of the Buffalo Dry Dock Co.

A new double smoke stack, new whistle and minor repairs are being made on the steamer Albert E. Stewart of the Stewart Transportation Co.'s fleet, Detroit.

The steamer Isabella J. Boyce, of the Pringle Barge Line, St. Clair, Mich., is receiving a new firebox boiler, 130 lb. steam, furnished by the Marine Boiler Works, of Toledo, and is to be equipped with a Harmon

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feed water purifier built by the Harmon Feed Water Purifier Co., of Cleveland.

The steamer Colonel, of the Michigan Steamship Co.'s fleet, Detroit, was docked at Buffalo during the winter for repairs to her bottom, made necessary through her grounding in the Straits of Mackinac last summer. It was also found that the tail shaft was bent and had to be straightened. The pintle bushing for the rudder was badly worn and had to be renewed and a plate had to be fitted under the riding collar to raise it to its original position.

The Montreal & Cornwall Navigation Co., Ltd., Cornwall, Ont., are making a few alterations on the steamer Britannic, putting in a new combustion chamber in the boiler and new bulwarks. This company has also begun to rebuild the wreck of the steamer Filgate, which was burned last summer.

The steamer Minnetonka, of the Chicago & Duluth Transportation Co.'s fleet, will receive a new stack before the opening of navigation.

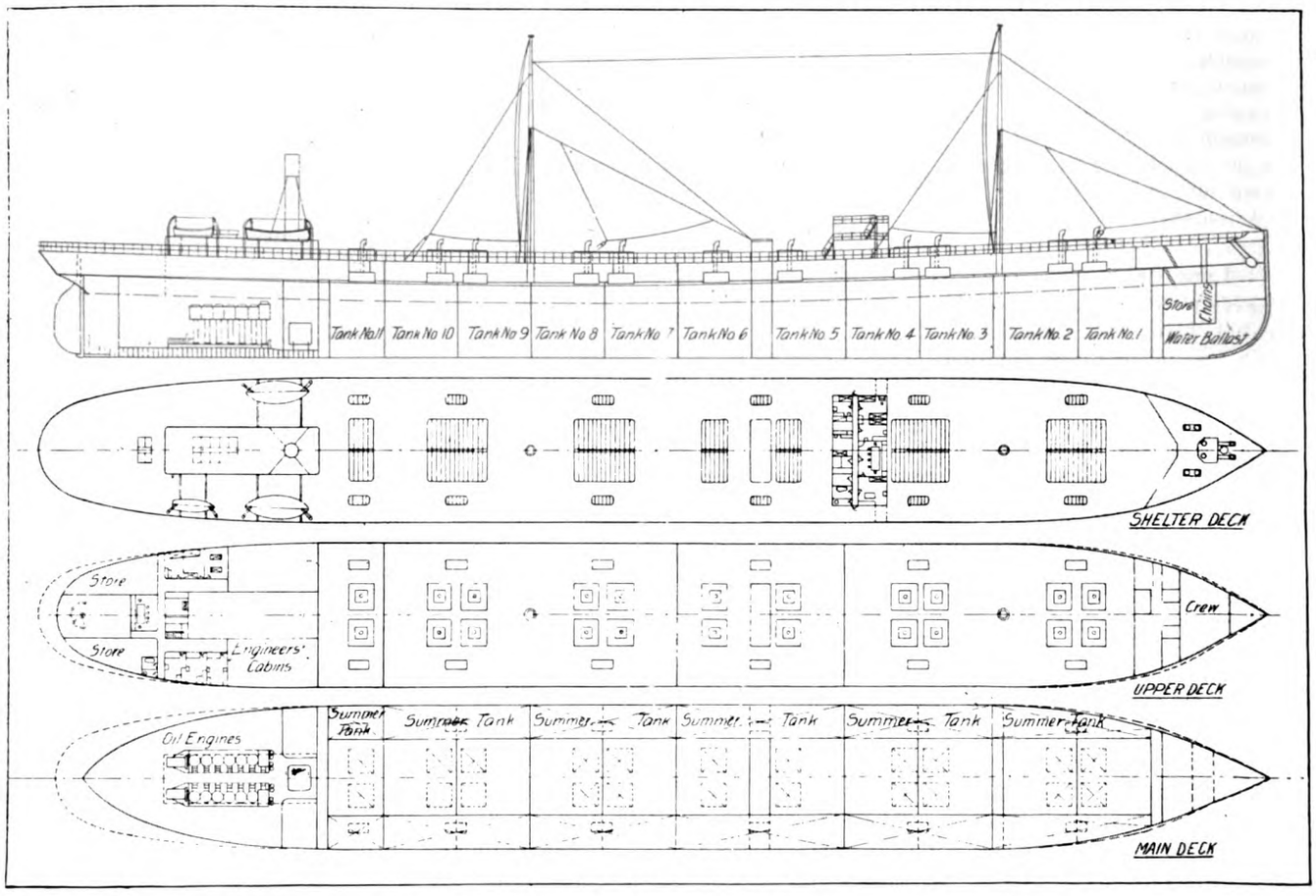
The schooner Major Ferry, belonging to the fleet of J. Sowards, Kingston, Ont., has been practically rebuilt, having received new port and starboard bows, new bowsprit and jib boom, and four strakes, new planking on both sides from bow to stern. The schooner Mazie, of this fleet, has received new planking on both sides from the water up, and the steamer Sowards has received a new shear strake and covering board, new guard and rail, boiler and engine thoroughly overhauled and an independent air pump connected to her engine.

British-Built Diesel Engines

THE credit of taking delivery of the first British-built Diesel marine engine belongs to Messrs. Job Brothers, ship owners, Liverpool, whose vessel Netherton has just been engined by Messrs. J. I. Thornycroft & Co., Ltd., of Southampton. The Northern will trade between Newfoundland and South America.

The past year has seen some remarkable strides made by the Diesel engine in its adoption for marine and shore purposes. It can further be said that the extraordinary success achieved by this particular type of engine overshadows that made by any other. Certainly in the modern history of engineering and mechanics the Diesel engine stands out with marked prominence. Both on land and sea it has—by reason of economical and easy working and good results—proved popular to a degree, and is rapidly and in no small measure encroaching on the steam engine. Of late there has been quite a demand for this oil engine, particularly for marine purposes. After Germany, other countries have not been slow to recognize the possibilities likely to accrue from the adoption of the Diesel type of engine, and in this respect Great Britain is prominently to the fore.

A still more important Diesel engined vessel is the 7,400-ton deadweight ship, Selandia, which, on Feb.



GENERAL ARRANGEMENT OF 14,000-TON BULK OIL CARRIER WITH DIESEL ENGINES

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14, underwent her trials. This vessel has been built by Messrs. Barclay, Curle & Co., Ltd., on the Clyde, and this firm are at present completing a sister ship, the Jutlandia. The Selandia is fitted with two 2,500 h. p. Burmeister & Wain Diesel engines, driving twin screws, and the propelling machinery is now officially reported to have worked to the entire satisfaction of all concerned. She did 13 knots through the thin ice on the Baltic, and was in every way found to be a fine, seaworthy vessel.

Representatives of the shipping world from many countries in Europe, including England, were aboard. All agreed that the ship will effect a complete revolution in navigation. One of the most remarkable things to be noticed is that the Selandia created no vibration whatsoever, her running being very steady throughout, although she had to force herself part of the way through loose ice.

Licensed to Build Engines

Many British ship building and engineering firms have taken out licenses for the manufacture of one or other of the continental Diesel engines. The Clyde Ship Building & Engineering Co. have gone for the Carel engine, and are building at present a vessel for the great lakes of America, to be fitted with a Carel engine of 1,000 h. p. Messrs J. I. Thornycroft, Southampton and London, and Messrs Richardson, Westgarth & Co., Middlesborough, are also building under license, from Carels Freres, Ghent. The set of engines which the latter firm is at present building at Middlesbrough are of 1,000 h. p. and of the Carels-Westgarth two-stroke Diesel marine type. The engines will be fitted into a 3,150-ton cargo boat, under construction by Sir Raylton Dixon & Co., to the order of Messrs. Furness, Withy & Co. She is expected to be ready for sea this spring, and is intended for the Atlantic trade.

Messrs. J. S. White & Co., Ltd., of Cowes, have taken a license from the M. A. N. Co., of Nuremberg, Germany, and have no fewer than five small engines of this type building.

A firm, however, which has not taken up the manufacture of foreign engines, and one which is prominent in the oil engine world, is Messrs. William Beardmore & Co., of Dalmuir, Scotland. Messrs. Beardmore were amongst the pioneers of the marine producer gas installation, and they deserve success, for no firm has spent more money on experimenting with internal combustion engines. Since the Beardmore semi-Diesel engine was put on the market some two years ago, it has been fitted to different types of commercial vessels around the coast with marked success, with the result that there are nearing completion at present in the works at Dalmuir about 20 crude oil engines of this class for coasting craft and as auxiliary power to trading sailing vessels. In the matter of Diesel engines proper, Messrs Beardmore have just secured an order which cannot but have great bearing on the coaster of the future. The contract is for two engines of 160 b. h. p. to be installed in two coasting vessels of 350 tons d. w. carrying capacity, about to be laid down for the Glasgow Motor Coasting Co. Messrs. Scott & Co., of Greenock, are also building a British submarine which will be fitted with Italian Diesel engines.

A 14,000 ton Vessel with Deisel Engines

The German-American Petroleum Co. have building to their order at Messrs. Krupp's Germaniawerft, Kiel, a vessel which, when completed, will be the largest bulk-oil carrying ship in existence. The leading dimensions of this vessel, as given in the *Ship Builder*, are:—Length B. P., 525 ft.; breadth molded, 66 ft. 3 in.; depth molded, 41 ft. 3 in., and she will have a deadweight-carrying capacity of about 14,000 tons. The ship is being built to the highest class of Lloyd's Register on the Isherwood system, and is of the shelter-deck type, having three decks running from stem to stern, as will be seen from the general arrangement reproduced herewith. As the shelter 'tween decks are not included in the tonnage measurement, the vessel will have a very favorable net tonnage in relation to the deadweight capacity.

The oil tanks occupy about two-thirds the length of the ship, and are divided by transverse bulkheads into 11 spaces, which in turn are divided by a longitudinal oil-tight bulkhead into 22 tanks. The oil tanks extend right across the ship up to the main deck. Between the main and upper decks is a continuous expansion trunk of the usual type, to limit the free surface of the oil. Alongside the expansion trunk are arranged so-called summer tanks, which provide extra capacity when lighter oils are carried or when the vessel is loaded to her deepest marks.

Considerations of trim will not permit the filling of the two foremost tanks with oil of the same density as in the remaining compartments, but these forward tanks can be used for lighter oils or for liquid fuel bunkers. A third cofferdam is, therefore, placed between tanks Nos. 2 and 3 to separate the two kinds of oil, in addition to the usual cofferdams at the forward and after ends of the tanks. The pump room is situated between tanks Nos. 5 and 6. The pumps have cylinders, 15 in. and 12½ in. diameter, respectively, with a stroke of 18½ in., and are arranged to discharge from any tank overboard or to any other tank, and also to fill the tanks from the shore.

A steam-driven ventilating fan will be connected to the suctions, so that dangerous vapors can be drawn away from the bottom of the tanks and fresh air afterwards blown in. Vapor-discharge pipes are also led from all the tanks to a considerable height up the masts. The most interesting feature of the vessel, however, is that she will be propelled by two single-acting two-cycle Diesel engines of the Germaniawerft's own design. These engines will develop about 3,500 b. h. p. at 125 r. p. m., and will give the ship a sea speed of about 10 knots per hour. A small dinkey boiler is provided for supplying steam to the auxiliary machinery, some of which can be alternated by compressed air.

Ship Painting

Ship painting is discussed in a paper by Naval Constructor Henry Williams in the proceedings of the United States Naval Institute. He believes that a considerable part of the annual expenditure of $1,000,000 for painting our naval vessels could be saved by using less expensive materials, because most of the paint on ships is painted over before it has perished. Ample proof of this is the thickness of the paint on various parts of old ships and the scaling of old paint that goes on continually on men-of-war. Granting, for the sake of argument, that the new paint materials, such as turpentine substitutes, linseed oil substitutes, the inert fillers, etc., have not the durability of the materials heretofore used, it would even then be reasonable to use them. When a house on shore is painted, the owner expects the paint to last at least two years and would not consider cheaper materials if he felt that it would shorten the life of the paint appreciably. The labor cost of painting is too high. He does not expect to repaint until the paint film has disintegrated and the wood or metal begins to show through. Ships are repainted, however, for other reasons, and it is rare that any part of the ship that is visible goes more than one year without repainting, most of it being painted three or four times a year.

The steamer Old Colony of the Maine Steamship Co.'s fleet has gone to the yard of the W. & A. Fletcher Co., Hoboken, N. J., for repairs.

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Improvement of Tacoma Harbor

The Details of a Plan to Develop and to Control an Important Water Front---Creation of New Waterways

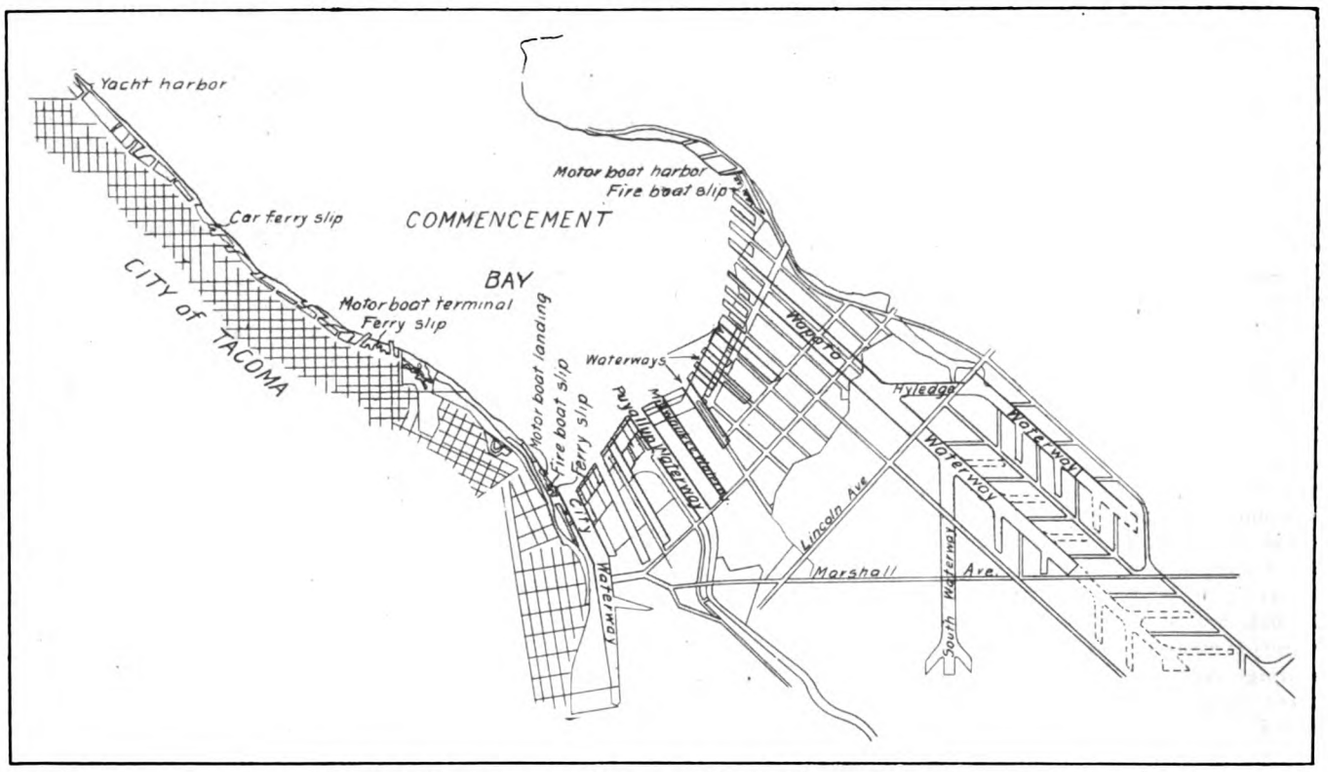
ON Jan. 8, 1912, a report embracing plans for the improvement of the harbor of Tacoma, Wash., was submitted to the harbor study committee of the Chamber of Commerce and Commercial Club of that city, by Virgil G. Bogue, consulting engineer. The details of this study have been recently made public and legal steps are now being taken to insure the working out of these plans.

The scheme proposed involves the organization of a port district under the state laws of Washington, bringing eventually the entire harbor under public control, and it also recommends the public ownership of all railway tracks approaching and reaching the harbor facilities. The construction of a large waterway with two branches on the north side of the tide flat district is recommended, as shown on the accompanying map. This is known as the Wapato-Hylebos project. Extensive improvements to the existing Puyallup waterway are proposed, together with the construction of several piers, ferry slips and motor boat harbors between the Puyallup river and Point Defiance on the south side of the harbor.

The harbor of Tacoma, it may be explained, embraces the shores of Commencement Bay from Brown's Point to Point Defiance, a distance of 11.1 miles. The bay itself is about two miles across and very deep in the center. The city is built along the southern shore. At the head of the bay, on the southeast, is an extensive tide flat, about eight square miles in area, produced by deposits from the Puyallup river, which empties into the southeast corner of the bay. On this tide flat are located the railroad terminals, and many of the mills and industrial plants of the city; at present, practically all of it lying north of the Puyallup waterway is undeveloped. It is in this region that Mr. Bogue's plans contemplate the greatest changes.

The Wapato-Hylebos waterway project includes three proposed waterways, viz.: The Wapato waterway, which extends from the suggested outer harbor line in a southeasterly direction, parallel with the center line of Willapa avenue, to a point in the vicinity of Marshall avenue; the Hylebos waterway, which extends from a connection with the Wapato waterway between South Eleventh street and Lincoln avenue, southeasterly, to a point in the vicinity of the center of section 36; and the South waterway, which branches from the Wapato waterway at a point about 1,200 ft. southeasterly of Lincoln avenue and extends in a southerly direction to a point about 500 ft. northerly of the south line of section 2. The Wapato and Hylebos waterways are so planned that they may readily be extended, as indicated by the dotted lines. It is intended that Hylebos creek shall empty into Hylebos waterway and that Wapato creek shall discharge into Wapato waterway at points which may be selected to best suit the conditions.

The Wapato waterway between the suggested outer harbor line and Lincoln avenue will be 700 ft. in width, in order to provide room for the traffic which will eventually pass through it to and from the waterways farther inland, and at the same time give ample space for vessels and barges or lighters, which may be discharging or be loading along the bulkhead or quay frontage on each side thereof. From Lincoln avenue southeasterly the Wapato waterway will be 500 ft. wide. The Hylebos waterway will be not less than 400 ft. wide and the south waterway not less than 500 ft. The figures given for widths of these waterways may be regarded by some as too liberal, but all experience shows that modern commerce with its varying requirements and contingencies demands waterways and slips of much greater width than was customary 15 to 25 years ago.



PRINCIPAL FEATURES OF A COMPOSITE MAP OF TACOMA HARBOR

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From the south side of Lincoln avenue to the outer harbor line it is believed that the best results will be obtained by the construction of quay landings. Thus improved, this section of the Wapato waterway would ultimately become a most important terminal for large cargo steamers.

In this connection it is desirable, before giving any figures, to become familiar with some details. The flats on which these waterways are proposed to be located, are nearly level and are nowhere more than a few feet above high tide. Outside the meander line, that is, northward therefrom, the tide flats fall away rapidly to the suggested pier head or outer harbor line, where they reach a level of about 30 ft. below low tide. The flats may, therefore, be considered in two parts, that first described being south of the meander line, and generally somewhat above high tide, while that to the north of the meander line is subject to overflow during every tide. The extreme tidal range is about 18 ft., but the ordinary high tide reaches a level about 14 ft. above ordinary low tide. Provision has been made for a turning basin at the south end of the south waterway. This turning basin to consist of the main channel and a wide slip on each side, where vessels can be turned without difficulty, the slips themselves being used in the meantime for commercial purposes. Construction of turning basins for the Wapato and Hylebos waterways will be delayed until they are extended. The slopes of the sides of the waterways are assumed at 2 to 1, this having been found sufficient on waterways that have thus far been built in other parts of the harbor. It is intended that the bulkheads and adjoining properties shall be brought to a level not less than 22 feet above datum by excavation from the waterways, slips, etc.

The total construction cost of this project, including turning basin of south waterway is estimated to be.....	$3,685,816
Turning basin.....	173,907
Cost of canal proper.....	$3,511,909

Not less than 10 per cent should be added to these figures for administration, contingencies and engineering, and they then become:

Cost, including turning basin..	$4,054,397
Turning basin.....	191,297
Net canal.....	$3,863,100

The aggregate area of right-of-way for these waterways, including the turning basin of the south waterway, will be 399 acres. The cost of right-of-way is indeterminate and is not included in the estimate of cost. Prices named by men familiar with the property vary all the way from $1,000 to $2,500 per acre.

Between the Milwaukee and Wapato waterways three short waterways are suggested, all below South Eleventh street. The most westerly of these is located on the axis of Skagit avenue, with a width of 400 ft., and the third, between Snohomish and Nisqually avenues, with a width of 387 ft. These waterways are virtually large slips or basins, and will be improved with quay landings.

Employment of Harbor Boats

In connection with the port business, which these projected waterways and plans may ultimately serve, there will be employed a large number of harbor boats, lighters, etc., which will require accommodations. Undoubtedly most of these harbor vessels will be motor propelled, so that motor boat landings are provided at all convenient points, namely, at shore ends of the waterways and basins and at points where there are highway bridge crossings.

Marginal streets will be located on each side of the waterways, as shown on the map, of ample width for at least three railway tracks. In addition to these marginal streets, several main avenues or arterial highways are necessary in order to properly connect the different sections of the tidelands and make the district easily accessible from the retail and residential sections of the city. The principal highways in this district are South Eleventh street, Lincoln avenue, Marshall avenue, Nisqually avenue, produced, and a proposed new street designated on the map as the Tacoma-Seattle highway. Lincoln avenue is the first through cross street south of the outer harbor line and is of great importance on account of its giving direct connection with the retail section of the city, and for the reason that it will ultimately form part of an important highway extending northward along the westerly side of the ridge between White river valley and Puget Sound.

The City Waterway

The city waterway, on account of its proximity to the retail center of the city, is much used for local city and freight business, although some large grain and cargo warehouses are now located thereon. It is likely, however, that ultimately this waterway will be given over almost entirely to coastwise Puget Sound and city business, and that the cargo shipping will be handled elsewhere. At South Twenty-first street a viaduct is proposed across the waterway, and while, for the time being, a sufficient opening may be left to permit the passage of logs and small boats, yet eventually, it will probably be found advantageous to fill the small portion of waterway south of this street. Between the Puyallup and middle waterways a slip and pier construction is considered most desirable. The slips should not be less than 1,100 ft. in length, to insure accommodation for the largest vessels likely to enter the port.

A proposition to lease a portion of the state property between the inner and outer harbor lines has been under consideration by the city. If this has been accomplished, as is reported, the property between the inner harbor line and Railroad avenue will be acquired, thereby providing for a complete shipping terminal with piers, warehouses and railway facilities necessary to a well balanced project. Between the middle and city waterways three piers, 800 ft. long, are suggested, also a warehouse and industrial layout back of the piers. This property is owned by the Northern Pacific railway.

Great Field for Power Boat Activities

At first glance, it may appear that the motor boat has been given undue prominence in this plan. It must be borne in mind, however, that Puget Sound, with its thousand miles of landlocked bays and channels and its thousands of miles of tributary waters, in British Columbia and Alaska, all safe for motor boat navigation, presents probably the greatest field for motor boat activities in the world. At the shore ends of the waterways and larger slips, floats and other facilities will be provided for these small boats. At the shore end of the middle waterway, where the city owns some property, is a good location for small motor boats.

Between the smelter and the present wharf and pavilion in Point Defiance Park is an important waterfront district suitable for recreation and pleasure purposes. It will probably also become the terminus for ferries plying to Vashon island and West passage points. These ferries will be the link to join the city boulevard system with the roadways and boulevards on Vashon island and the country west of the West passage. Suitable ferry slips and recreation piers will be built at this point. A possible location for a dry dock would be at Chambers creek, near Steilacoom.

Permanent improvement of the lower portion of the Puyallup river is proposed at a cost of $433,700, including riprap, levees and excavation to straighten and widen the channel. In 1906, the White river, one of the streams arising in the mountains east of Tacoma and flowing in a general parallel direction to the Puyallup, overflowed its banks and cut a new channel forming a junction with the Puyallup. This doubled the flow of the latter, making it during floods reach 34,000 second-feet. The river improvements mentioned above are designed to take care of this flood stage and prevent the damage to abutting property, which periodically occurs at present.

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Great Industrial Activity at Seattle

The Seattle Construction & Dry Dock Co. is Preparing for the Commercial Development Which is Certain to Follow the Opening of the Panama Canal

SEATTLE, March 6.—With $1,250,000 available for improvements and alterations, the Seattle Construction & Dry Dock Co., formerly the Moran Co., has inaugurated a program which it is expected, when completed, will make this plant the most modern and up to date on this coast. President J. V. Paterson already has his plans well under way and has a large force working on the new steel drydock, which is the most important unit of the improvements authorized. This will be a 10,000-ton dock, 460 ft. in length and 110 ft. in width. It will consist of six pontoons and will accommodate vessels up to 12,000 tons and 500 ft. in length. It is now under construction at the company's yards and it is expected to have it in operation in eight months. Its location will be south of the present mold loft. On this site the company has already commenced a large dredging contract involving the dredging of about 300,000 cubic yards. A large channel will be excavated giving a depth of between 40 and 50 ft. and at the head of this channel the new dock will be located. This plant will have electrically-driven pumps of about 18-in. capacity and in every respect it will be modern and complete. Its cost will be about $500,000. The company will retain in service its present small wooden dock, length 299 ft., capacity 3,000 tons. However, this may be removed from its present site to one close to the larger dock.

Two New Concrete Piers

In addition to the new steel dock, the improvement plans include two long concrete piers at which ample berthing space will be provided for steamers which come alongside for boiler, machinery and other repairs not requiring docking. These piers will be modernly equipped with cranes, tracks, shear legs and every other necessary facility for doing work rapidly and economically. The plans for these piers are not yet definitely worked out.

The company's foundry is also to be remodeled. Additional equipment in the form of modern machinery and tools will make this one of the best on the coast. Throughout the plant additional tools are being installed and when this program is finished the plant will be thoroughly equipped with modern appliances replacing many tools which had become obsolete or worked out. The machine shop has lately been equipped with Lodge & Shipley lathes.

Another important improvement which is shortly to be undertaken is the construction of another building slip south of and the same size as the present slip. This will add space for laying the keels for additional vessels. Recently there has been a large number of contracts undertaken and in consequence the present slip is seriously crowded. It has not been decided whether the new slip will be built under cover or not. The present slip is under a shed roof. This large plant is at present employing 1,100 men.

Personnel of Company

Under the reorganization, J. V. Paterson holds the same offices as before, president and general manager. C. B. Lamont is assistant to the president. Holden A. Evans, until recently naval constructor in the United States navy, has become second vice president of the shipbuilding concern. Mr. Evans' last assignments in the navy were at the Mare Island yard and later at the Moran plant supervising the construction for the navy of submarines F3 and F4. He resigned recently to accept his present position. H. W. Kent continues as treasurer of the new company.

Among the contracts under way at this plant are the five whalers, six submarines and passenger steamer Solduck, the latter for the Inland Navigation Co., as described in the January issue of THE MARINE REVIEW. During the past month a contract was awarded this yard by the Inland Navigation Co. for a steel passenger steamer to be called the Potlatch. This word is derived from an Indian name signifying a big feast. Seattle has an annual fair called Potlatch, and in commemoration thereof the new steamer is to be ready for launching during Potlatch week, beginning July 15, next. The Potlatch will cost about $150,000, and is designed especially for the tourist and passenger traffic to picturesque Hood canal, an arm of Puget Sound. The dimensions of this steamer will be: Length 168 ft., beam 28 ft. and depth 10 ft. She will have steam radiators in each state room, hot and cold water with folding porcelain wash basins, and cabins designed largely after the modern Pullman cars. Promenade deck and observations have been given special attention. The Potlatch will have a speed of 13 knots.

The main engines of the Potlatch will be open-fronted, triple-expansion, three crank of these dimensions: 15-in., 24-in., 38-in. x 24-in. The direct pressure of steam will be 180 lbs. at engines and 200 lbs. at boilers. There will be two main, Seabury water-tube boilers, with a total heating surface of 3,000 sq. ft. The indicated horsepower will be 650. One unique feature is that all the pumps, air, feed, circulating, condensor and donkey, will be independent. The Potlatch will burn fuel oil and the direct pressure atomizer system will be adopted, with either Dahl or Schuette - Koerting burners.

The Seattle Construction & Drydock Co. last week completed its contract for repairing the steamer Virginian, of the American - Hawaiian line, which was damaged in collision with the lumber laden British tramp Strathalbyn between Seattle and Tacoma last month. On the coasting steamer City of Puebla this firm has also completed a remarkable contract which included the casting of an 18-ton high - pressure cylinder. The Puebla blew out her high-pressure cylinder in local waters Dec. 18, and it did serious damage in the engine rooms. Experts expressed doubt if a duplicate cylinder could be cast here but the local company offered to do the work and after nearly a month of preliminary work the cast was successfully made.

Extensive Remodeling

On the Alaska liner Victoria, of the Alaska Steamship Co., the Seattle Construction & Drydock Co., has work well under way. This is a very large contract involving the expenditure of about $150,000 in practically remodeling the old steamer. Two of the largest double ended boilers ever built on the Pacific coast have been installed in the Victoria as well as oil burning apparatus and tanks. Much of the upper house and cabins has been rebuilt and remodeled, hatches enlarged and overhauling throughout. This vessel will be re-

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turned to her owners in March. The freighter La Touche, of the same fleet, is also at these yards undergoing work costing about $40,000. Her well deck has been built up flush with the forecastle and the former bulwarks, thus largely increasing her capacity as a carrier. This steamer, which was built by the Moran Co in 1910, is engaged in the general trade between here and Alaska, copper ore and canned salmon being the principal cargo brought from the North. With the improvements completed the La Touche will be perfectly adapted for this trade.

The same company last week was awarded a contract for about $8,000 repairs on the United States army transport Dix. The local steamer Flyer was at this yard for new stern post and other structural repairs and steamer Santa Ana is undergoing repairs to keel and hull, following damage by grounding in Alaska. She will be on the dock for a week or ten days. Steamship Princess Adelaide, of the Canadian Pacific fleet, has been converted into an oil burner. The local company is turning out large contracts for structural steel tanks and retorts of all kinds, furnishing steel for a new Seattle theater and tanks for a large creosoting plant. A good demand is reported for stamp mills, concentrators and the Weeks patented two line shovel, all of which are manufactured and handled by the local plant. With increased capacity for docking, repairing and manufacturing, President J. V. Paterson and his corps of assistants are anticipating a busy future.

Battleships Oklahoma and Nevada

The navy department has prepared a sketch outlining the general appearance of the battleships Oklahoma and Nevada, now building. The general dimensions and features of each vessel are as follows:

Length on designer's water line, 575 ft.; breadth, extreme, at designer's water line, 95 ft. 2⅝ in.; mean trial displacement, 27,500 tons; mean draught to bottom of keel at trial displacement, (about) 28 ft. 6 in.; total fuel oil storage, 2,000 tons; fuel oil carried on trial, 1,333 tons; feed water carried on trial, 165 tons; speed on trial, not less than 20½ knots.

Armament.—Main battery: Ten 14-in. 45-caliber breech-loading rifles: four submerged torpedo tubes. Secondary battery: Twenty-one 5-in. rapid-fire guns, 51-caliber; four three-pounder saluting guns; two one-pounder semi-automatic guns for boats; two 3-in. field pieces, two machine guns, 0.30 caliber.

Contract for the Nevada was entered into with the Fore River Ship Building Co. on Jan. 22, 1912, and for the Oklahoma with the New York Ship Building Co. on the same day.

Diesel Engines in Yachts

The Diesel engine is as well suited to the high powered seagoing yacht as it is to the coasting steamer or ocean liner. The same advantages are gained in the one vessel as in the other. The extra space given to cargo in the commercial vessel is put to the cabin accommodations of the yacht, while the increased stability gained by the low center of gravity of the oil engine is better appreciated in the yacht as she is usually a vessel of finer lines and more in need of it. Although they have been built abroad a fair number of yachts up to 150 ft. in length are fitted with paraffine engines and also crude oil engines of the semi-Diesel type, there have been few yachts built with the Diesel engine proper.

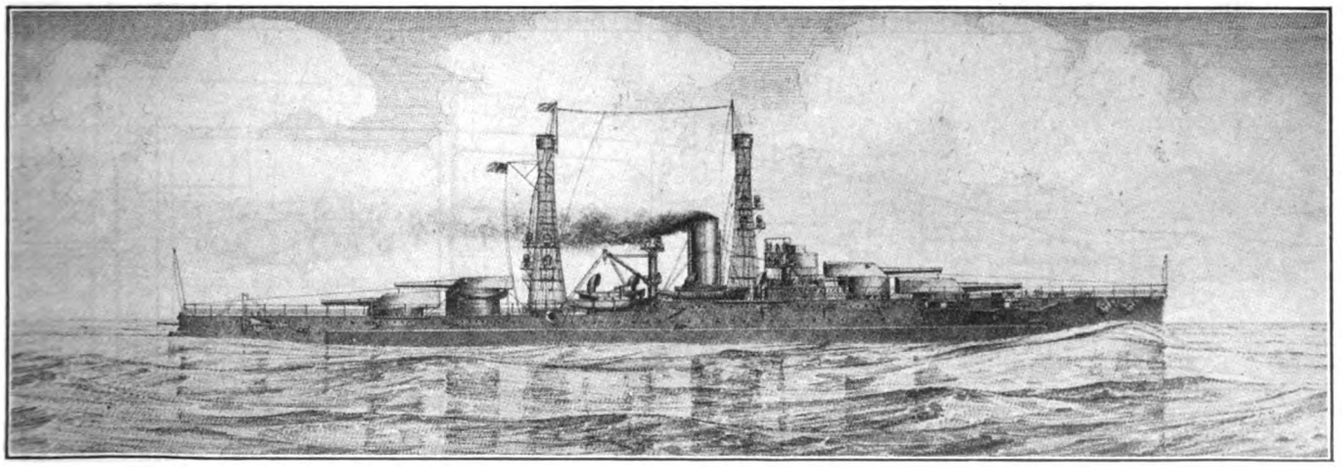
Louis Noble, of St. Petersburg, head of the great Russian engineering firm, has, however, recently built a 20-knot twin-screw yacht equipped with Diesel engines for his own use. The engines have six cylinders and are fitted with a two-stage air compressor developing jointly 700 h. p. The valve gear is overhead and completely boxed in. These are the first two-stroke reversible engines that have been built in the Noble works.

Concrete Motor Boat

Reinforced concrete motor boats are made by a firm in Holland. The framework is made up of a steel keel to which are attached steel rods running in two directions; these rods are bent to the required shape and wired in position so that the metal framework is self supporting. On both sides of this framework an inner and outer covering of wire netting is secured with metal ties and then plastered on both sides. After the hull has thoroughly hardened for several weeks it is given five coats of waterproofing paint. All the fittings of the boat are put in place prior to the plastering, so that they are solidly embedded in the concrete.

The international conference on maritime law will be held at Brussels next September. The conference will take up the study of codifying the laws of maritime law concerning the limitation of the liability of owners of seagoing vessels and those concerning liens and mortgages. The United States will participate.

John K. Bulger, formerly local inspector of boilers at San Francisco, has been made supervising inspector for the first district. His territory embraces Portland, Ore., Seattle to San Francisco and all internal tributary waterways as well as Honolulu, H. I. Geographically his district is the most extended of all.



UNITED STATES BATTLESHIPS NEVADA AND OKLAHOMA *From a Department Sketch*

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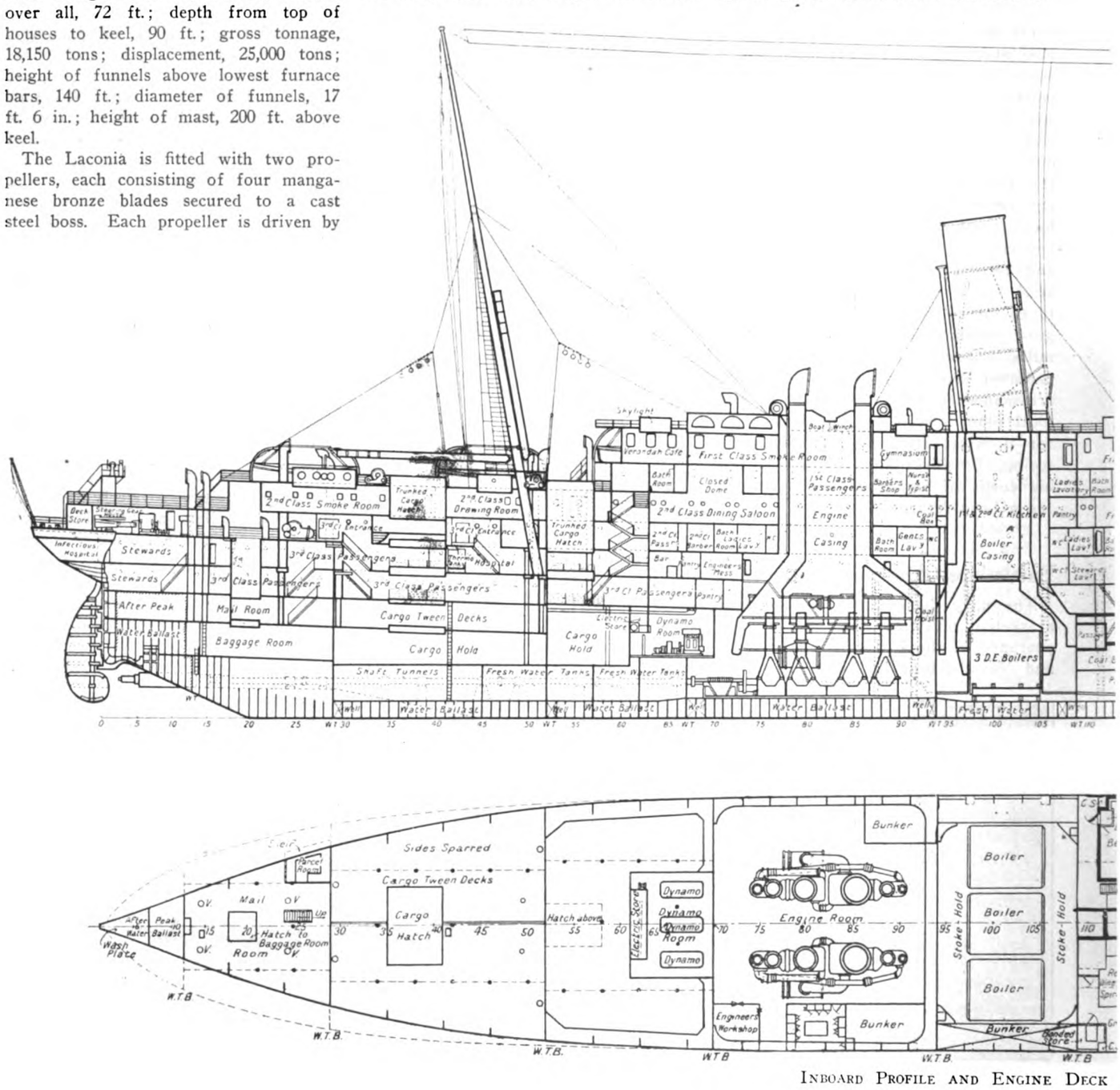
Latest Cunard Liner Laconia

THE latest steamship to enter the North Atlantic service is the Laconia, of the Cunard Line. She sailed from Liverpool on Jan. 20, bound for New York, though her regular service will be to Boston. The Laconia belongs to the intermediate class as distinct from the express class, though she is a considerably larger ship than either the Ivernia or Saxonia, and is even a little larger than the Franconia. The Laconia was launched on July 27 last, so that no time was lost in getting her ready for service. The Laconia's leading particulars are: Length over all, 625 ft.; breadth over all, 72 ft.; depth from top of houses to keel, 90 ft.; gross tonnage, 18,150 tons; displacement, 25,000 tons; height of funnels above lowest furnace bars, 140 ft.; diameter of funnels, 17 ft. 6 in.; height of mast, 200 ft. above keel.

The Laconia is fitted with two propellers, each consisting of four manganese bronze blades secured to a cast steel boss. Each propeller is driven by a four-crank, quadruple-expansion engine having cylinders, 33, 47, 67 and 95 in. diameter, respectively, with a stroke of 60 in. Piston valves are fitted on the high pressure, first and second intermediate pressure cylinders, the low pressure valve having an assistant cylinder. Both engines are dynamically balanced on the Yarrow, Schlick & Tweedy system. Steam is supplied by six large double-ended boilers having eight furnaces working under natural draft, the smoke being discharged through two funnels. The boilers are placed in two watertight compartments. The stokeholds are large and cool, ample mechanical ventilation having been provided in addition to the natural supply of air down the trunks, which are fitted with large cowl heads.

To facilitate overhauling and repairs to machinery a workshop is provided adjacent to the engine room, equipped with the necessary machine tools. The electric installation consists of three engines and dynamos supplying current not only for lighting the ship throughout, but also for a variety of other purposes, such as operating ventilating fans, dough mixers, plate washers and other culinary appliances, and also for operating the hoists, steam whistles, etc.



INBOARD PROFILE AND ENGINE DECK

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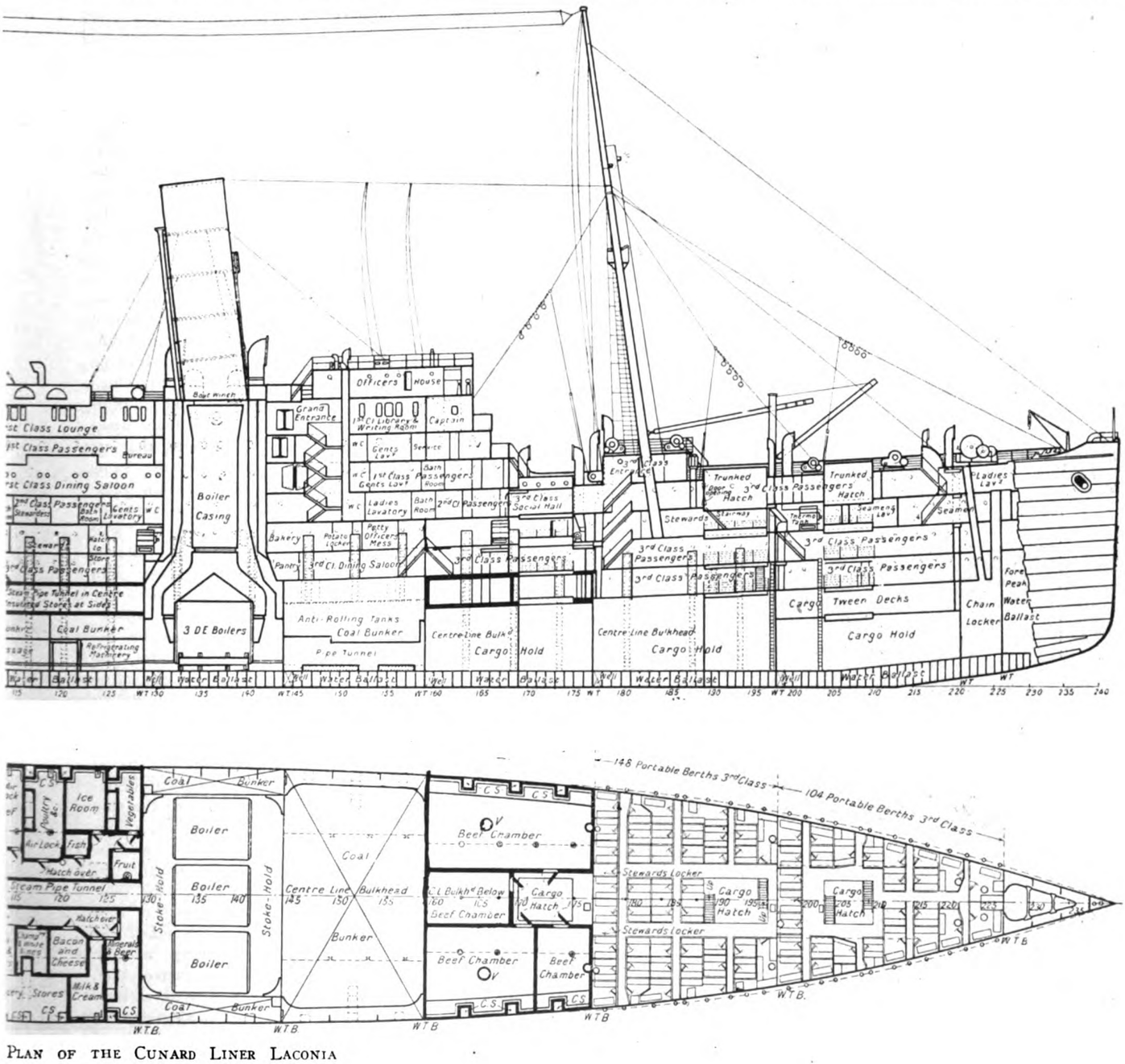
The Laconia is fitted with Marconi wireless telegraph and submarine signalling apparatus while a system of watertight compartments extends the entire length of the ship.

The Laconia is also the first British steamer to be fitted with Frahm's anti-rolling tanks, which are intended to increase steadiness and reduce to a minimum the discomforts incidental to rolling. In the trials of the Laconia sufficiently heavy seas were not encountered adequately to demonstrate the advantages of the anti-rolling tanks, but such evidence as has been obtained shows that their installation is fully warranted. The apparatus is under the constant observation of the Cunard Co.'s naval architect's department, and it is expected that valuable and convincing data upon this subject will be available in due season. Briefly this invention consists of two water tanks, divided into compartments placed amidships on each side of the ship connected across the vessel at the top by air trunks and at the bottom by specially constructed water passages. In the Laconia the tank is situated in the foremost thwartship bunkers and extends over 15 frames. By means of a watertight cross bulkhead the tank is divided into two unequal and absolutely independent compartments, the after part extending over nine and the forward part over six frames. The lower connections between the two side basins or lateral legs of the U are placed on the double bottom. The lateral basins are not watertight at the bottom; consequently the bilge is also filled as soon as the anti-rolling device is filled with water by pumps. The tanks are partially filled with water and the movement of the ship is checked by the water flowing from one side to the other through the passages. To provide for changes in the movement of the vessel the water, which is always under absolute control in the tanks, can be regulated according to circumstances. One or two compartments can be used, as required, by opening or closing valves fixed in the air trunks. By completely closing the valves, the passage of air from one side of the ship to the other is prevented and the water in the tanks is thus maintained practically motionless.



PLAN OF THE CUNARD LINER LACONIA

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Making Wax Models of Vessels

How the Work is Done at the National Physical Laboratory at Teddington. The Models Reproduce With Fidelity the Conditions Which Obtain in Actual Practice.

CONSIDERABLE attention has been paid within comparatively recent times to the development of a system of tests upon accurately formed models of full-sized war vessels and ships of the mercantile marine for the purpose of determining in advance the numerous problems connected with the movement of the vessel, when completed, through the water, and such tests have been so valuable in connection with problems such as speed and horsepower that several of the large ship building firms now make it a standard practice to fashion such models of their important vessels from the drawings to an accurate scale and to subject them to actual tests in experimental tanks before proceeding with the construction of the vessel itself. In addition to this in Great Britain the National Physical Laboratory, belonging to the government, which is situated at Teddington, has an experimental tank completely fitted for such testing purposes, and in connection with this we propose briefly to describe the method of production of the models of vessels in order to insure their absolute accuracy with regard to surface and formation presented to the water.

Description of the Installation

The installation which is to be described is of an entirely special character, and was constructed by Messrs. W. & T. Avery, Ltd., of Birmingham. A general view of this is illustrated in Fig. 1, while Fig. 2 shows more especially the method of electrically controlling the movements of the model-shaping apparatus. Fig. 3 shows in plan and end and side elevation the general arrangement of this model-shaping machine. In order to understand the work which this has to do, it is necessary to explain the general process adopted. This consists first of all in melting a large amount of wax in a water-jacketed galvanized iron tank, which is also furnished with pipes running through it which carry steam from a boiler so that the mass of wax contained in the tank which may be up to 1½ tons is uniformly warmed up to its melting point. Provision is made for the deposition of any impurities contained in the wax by gravity to the bottom of the tank, where they are retained, the pure wax being drawn off at a point a little above the lowest level into a mold. When the wax in the mold is set, it is taken out and the rough model is placed in its upright position so that the top surface corresponding to the deck is brought under the action of an electrically-driven rotary cutter. In this way an absolutely straight and even surface is produced corresponding to the horizontal section taken above waterline through the ship at deck level. When this is completed the model is inverted and is placed on the table of the special machine which forms the subject of these notes.

The carriage on which the model is thus placed runs on accurately machined horizontal rails so that it is at all times in perfectly true line as it travels forward and backward. Mounted so that they can operate on the wax model, thus drawn backward and forward by means of a main electric motor and worm drive, are two rotary cutters driven by vertical motors and the crosswise motion of these cutters relative to the table is regulated by gear so that it is at all times proportional to the motion of a pointer on a separate table carrying drawings which will shortly be described.

Shaping the Model

It will, therefore, be seen that these rotary cutters will take out the surplus wax at any predetermined height on the model to a greater or less degree at any point in the longitudinal travel of the model, corresponding to the position of the pointer on the auxiliary table carrying the drawing. This auxiliary table is also mounted on rails and by means of standards is placed at a suitable height for the operator to work comfortably, and on the table is placed a drawing giving the various waterlines to which the model is to be shaped. The auxiliary table is driven from the main drive by a change gear so arranged that its longitudinal travel can bear the same ratio to the travel of the main table that the scale of the drawing is to the scale which is required for the wax model and similarly the same ratio is given to the motion of the pointer with relation to the transverse motion of the rotary cutters. In this way by following any one of the waterlines on the drawing by means of the pointer, the cutters will gouge out a corresponding curve in the wax model and this process is repeated at varying heights of the wax for all the waterlines on the drawing so that the model is shaped into a series of ridges or steps accurately corresponding to the lines of the ship at all points. By shaving all the ridges down to a smooth surface, it will be seen that an absolute reproduction of the ship's surface to any required scale is produced. When the model is thus finished, it is carefully weighed by means of a special weighing machine which is so accurately adjusted that, although it can record up to a total weight of 2,500 lbs., it can also register a variation of weight of one-tenth of a pound.

After the model is finished in this

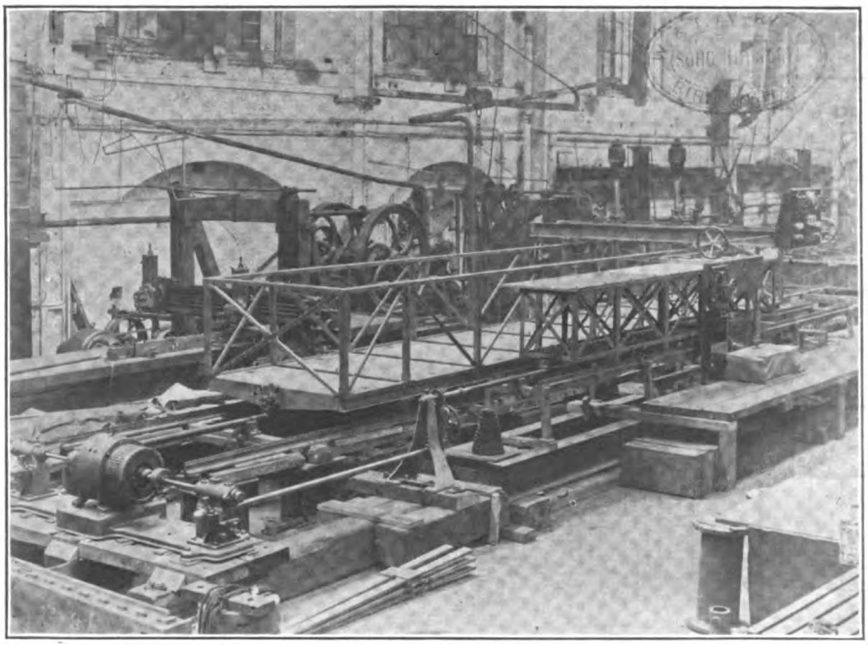

FIG. 1—MODEL SHOWING APPARATUS FOR NATIONAL PHYSICAL LABORATORY

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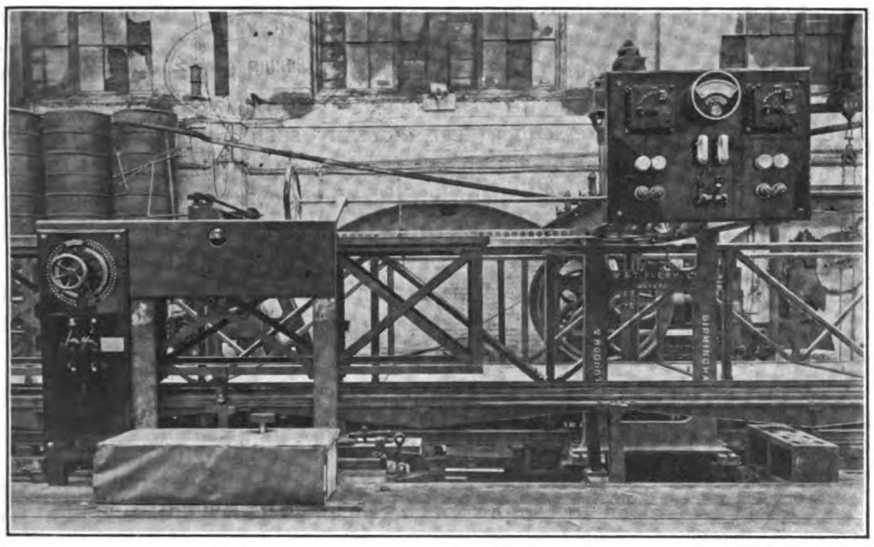

FIG. 2—SHOWING ELECTRICAL CONTROL OF MACHINE

way, it is subjected to a cross test in order to verify the accurate working of the cutters and the subsequent hand shaving. This consists of apparatus by means of which at any point along the length of the model a cross section can be traced from the surface of the model and by comparing such cross section with further drawings of the vessel on its vertical sections, the accuracy of the lines is determined along planes at right angles to those on which the model was shaped. This verifying gear is composed of a tracing arm provided with a finger which will move over the surface of the model on its cross section without any indentation, and the other end of the copying arm carries a pencil which will trace the curve thus formed. It will, therefore, be seen that the apparatus is so designed that the highest accuracy of production is almost inevitable, and therefore the experiments conducted on models in this way are calculated to reproduce with very great fidelity, the conditions which obtain in actual practice with the full sized vessel when it is completed. Hence a large amount of experimental work can be performed rapidly and at small expense, which materially assists the designer as to the best lines upon which to shape the vessel.

The Care of Chains

A valuable treatice on "The Care of Chains", issued by the Jones & Laughlin Steel Co., Pittsburgh, is just off the press and is being distributed free among chain users. It is a beautifully printed brochure in two colors, eight pages in size, and is chock full of just the information chain users need to show them how to get long life out of their chains. Many suggestions are made in this booklet as to how chains should be cared for so that they will last a long time. The most frequent cause for discarding chain, according to this booklet, is on account of breakage and that is most usually due to crystallization. Then the booklet goes on to tell how any one, on any job where chains are used, can overcome crystallization in chains by a very simple home-tratment process which will restore the chains to their original condition and make them useful for many months longer, thus effecting great economy. A post card to the Jones & Laughlin Steel Co., Pittsburgh, Pa., will bring this booklet by return mail.

Chain Graphite

The Joseph Dixon Crucible Co., of Jersey City, has just put on the market a new chain graphite, especially intended for lubricating the chains of motor trucks and pleasure cars.

This preparation is put up in sticks, cylindrical shape, 2 x 8 in., encased in a neat cardboard carton and weighing about 1 lb. each. It is made of the same material as the Dixon bicycle stick graphite, with which every bicycle owner is familiar.

It is by far the most convenient chain lubricant on the market, for a bar may be carried on the car ready for use at any time. To apply, it is simply necessary to rub the bar against the sprocket side of the chain. The "big stick" makes it easy to keep automobile driving chains in first-class condition. Unlike oils and greases, it will not collect dust and dirt.

George C. Shepard is about to sever his connection with the Maryland Steel Co., Sparrow's Point, Md., to become the superintending engineer of the American-Hawaiian Steamship Co.

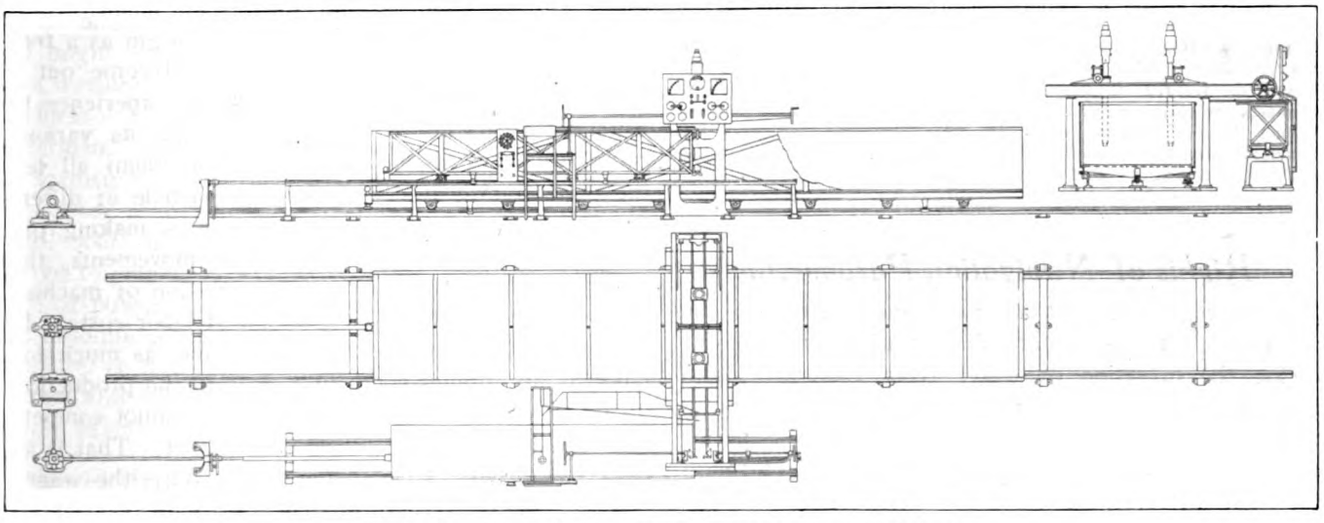

FIG. 3—SECTIONAL VIEW OF THE MODEL SHAPING MACHINE

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THE MARINE REVIEW

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Rights of Navigation Paramount

Lake vessel interests are much concerned over the application of the sanitary district of Chicago to increase the diversion of water from Lake Michigan from 4,700 to 10,000 cu. ft. per second. This is practically one-seventh of the flow from Lake Superior and one-tenth of the volume of water passing through the St. Clair river. The representation of the sanitary district is that the water is needed for sanitary purposes, though evidence was submitted to show that the flow is also utilized for light and power purposes. Of course, no one wants to quarrel with the city's desire to maintain the health of its people, but it does seem as though there were other means of accomplishing this result without taking so vast a volume of water from the lakes. For instance, filtration plants are used in many of the principal cities of the world, though Chicago does not appear to have given much thought to this method of purification.

Vesselmen fear that any such great subtraction of water would permanently injure the shipping of the lakes and disturb values everywhere. It is generally believed that the present subtraction has resulted in a lowering of lake levels. The sanitary district represents that a great many millions of dollars have been expended upon their drainage system, but in rebuttal the vessel interests prove that infinitely more money has been spent by the various municipalities along the lakes in deepening their harbors and by the government in building breakwaters and deepening channels. It is by reason of this generous use of public funds for the improvement of the channels that freight is carried so cheaply on the lakes. There is a less return to the individual owner for carrying it than there was in the days of the small wooden ships, but the people, as a rule, have vastly benefited by the reduction in charges. The importance of this waterway to the United States is not to be underestimated. It is a thing in which every citizen is concerned. It has practically lifted the United States to the premier position in iron and steel manufacture. The interest of one city is as nothing compared to the interest of the nation. In considering this application, the secretary of war should consider only the rights of navigation. They are paramount.

Protection a Necessity

If anyone wants to realize how intimate is the association between the protective policy and the wages paid to labor in the United States, let him read the testimony submitted to the senate finance committee on the metal schedule. He may begin as a free trader, but if his mind is open, he will come out a protectionist. It is a very illuminating experience to listen to men who take the ore through its various ramifications of manufacture and hear them all tell the same story. It doesn't make a particle of difference what the industry is, whether it is making pig iron, steel bars, tin plate or watch movements, the problem is the same. It is not a question of machinery or skill; it is simply a question of labor costs. If a manufacturer pays twice or three times as much for labor as his foreign competitor does in the production of the same article, it is certain that he cannot compete with his foreign rival in a neutral market. That is as clear as the nose on a man's face. Why, the wages are so low in certain branches of industry, chain-making, for instance, that the English chain manufacturers can land chain on the docks at Philadelphia at less cost than the American manufacturer can throw it on the floor of his own factory. Take tin plate. The margin of protection here is very slight. It is just sufficient to hold the seaboard trade which,

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in this industry, is naturally the greater part of the trade. Any such reduction as is contemplated in the Underwood bill would throw the seaboard trade to the English manufacturer.

Panama Canal Tolls

Congress will in all probability some time during the present month define the policy to be pursued in relation to the Panama canal. There are so many views in conflict at the present time that it is impossible to state what will be done, but it certainly will be a cardinal mistake if the canal is not made free to the American ship. This great waterway was built wholly out of funds supplied by the United States government and the government has unquestionably both legal and moral rights to administer the waterway in whatever way it choses. Whenever the United States government has desired to take advantage of its natural opportunities there are always treaties in the way. Someone is sure to discover a treaty working to the advantage of the other country. Treaties or no treaties, the Panama canal should be free to American shipping, otherwise no advantage will accrue except that of distance. If there is no other way to go about it, then the tolls should be remitted to American ships, a practice which is now pursued by a number of countries in relation to the Suez canal.

Good Bill to Kill

There is at present before congress a bill known as the Sherwood bill which among other things requires motor boats over 40 ft. long, carrying freight for hire, to have a licensed pilot and licensed engineer aboard. It also requires fishing motor boats over 40 ft. long to carry licensed engineers and pilots. This bill might as well be called an act to put a considerable number of men, earning an honest living, out of business. Power boats have latterly been adopted by fishermen, particularly on the coast. No finer body of seamen exists anywhere on earth than these same fishermen. They are the most skillful handlers of small boats in the world. Why should they be required to employ a licensed engineer? In the modern type of power launch the navigator in the pilot house has absolute control of the propelling machinery. This measure is now before the committee of merchant marine and fisheries. The committee should certainly report adversely upon it.

Viewed from almost any standpoint, the Underwood bill is an unconsidered thing. It seems to have been thrown together, little thought having been spent on it. One of the most vicious features is the substitution of ad valorem for specific duties. An ad valorem duty is a duty according to value. This antiquated system has been abandoned by every country as impractical. In spite of all precautions that may be taken, an ad valorem duty results in fraud upon the treasury. The temptation is always present. It is practically impossible for the customs officials to keep acquainted with the prices ruling for commodities abroad when one considers the wide range of our imports. The ad valorem system is a direct invitation to the foreign manufacturer to cheat the American treasury and to compete with the American manufacturer upon unfair grounds.

Influence of Panama On Suez

Will the main path of commerce from Europe to the fear east continue in the future to be eastward through the Suez canal? Or is a large part of this tremendous volume of traffic to be deflected to the westward and moved to the Orient by way of the Panama canal?

In the discussion of this question, which is one of those to come before the Twelfth International Congress of Navigation at the sessions to begin on May 23 in Philadelphia, the distinguished engineers who constitute that body will touch vitally upon one of the most significant phases of the Panama canal enterprise. It has been urged from time to time that this country is in a sense building the canal for the benefit of the great maritime nations of Europe. And at the coming sessions it will be asserted that a large part of the traffic of the Suez canal will, with the opening of the Panama canal, be drawn to the westward.

Elmer L. Corthell, of New York, in a paper on the dimensions to be given to maritime canals predicts that the competition of the Panama canal will compel the Suez Canal Co. to increase the dimensions of the canal, and it is plainly his opinion that unless this is done the traffic of the Suez canal will suffer. He quotes Prof. J. H. Biles, one of the greatest experts on naval architecture, to the effect that there is 20 per cent greater economy of transportation in vessels of 700 ft. in length than in vessels of 500 ft. in length when the draught is increased in the same proportion as the length.

It is obvious that this advantage in economy of transportation in ships of larger size will offset, if indeed it does not over-balance, the advantage of the shorter distance from Europe to the Orient by way of the Suez canal. It is, therefore, the conviction of students of the problem of transportation that the larger ships which may pass through the Panama canal will successfully compete with the smaller ships that can take the shorter and quicker route through the Suez canal.

That this is by no means a theory, but that, on the contrary, it is regarded as a very great danger by the Suez company is plainly shown by the fact that influential and progressive men in the Suez canal administration are already pressing for an increase in the size of the canal.

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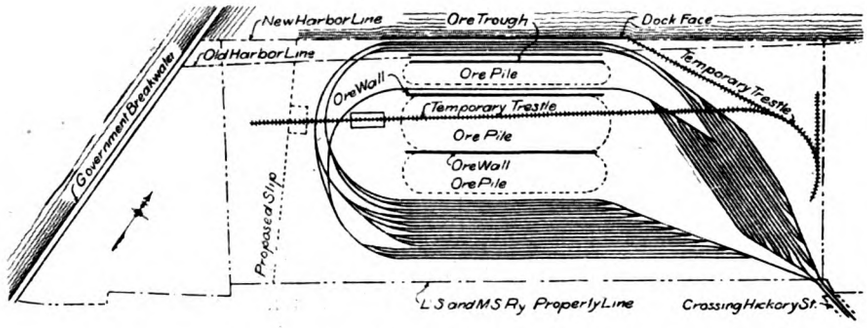
Modern Ore Handling Plant

Pennsylvania Railway is the First to Develop Cleveland's Outer Harbor for Handling Iron Ore---Its fine Equipment in the West Breakwater

UP TO the present year the Pennsylvania railway has received all of its ore shipments in Cleveland on Whiskey Island, in the old riverbed, where it has operated a battery of Hoover & Mason unloaders and Brown ore bridges. The steady growth in the size of the modern lake freighter has made this location undesirable owing to the difficulty of approaching it, there being scarcely clearance enough to enable the larger steamers to make the turn from the main channel into the old riverbed. There was also to be dealt with the problem of swinging the bridge carrying the main traffic of the Lake Shore railway with the result that during busy periods there was always either rail or vessel congestion at this point.



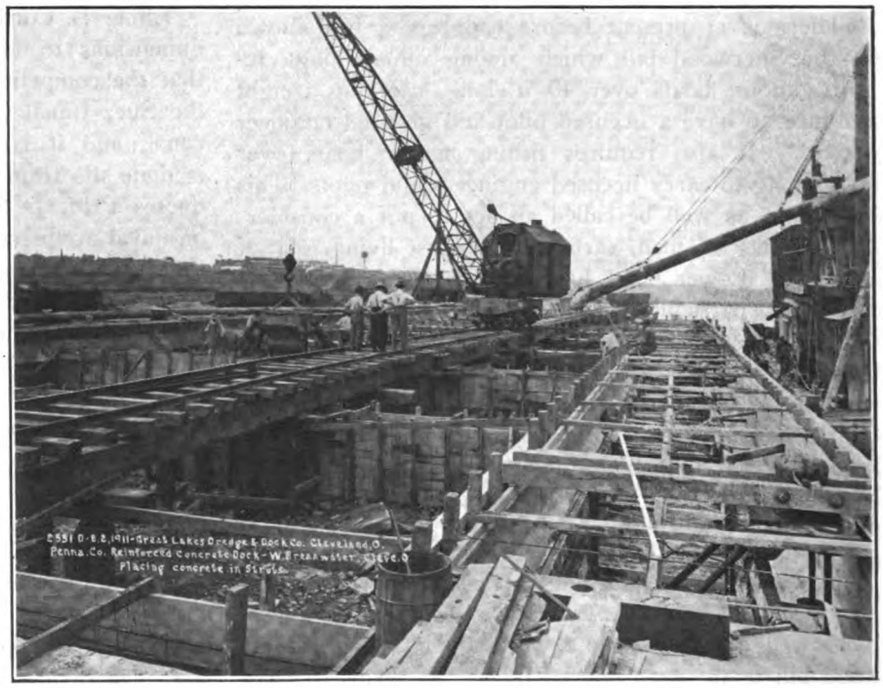
PLAN OF ORE YARD IN WEST BREAKWATER

To obviate these difficulties the Pennsylvania railway started two years ago to develop its property on the lake front in the west breakwater. The work necessitated a considerable fill and more than a year was spent in reclaiming the land. Approximately 40 acres were reclaimed by filling with slag and refuse collected on the Cleveland & Pittsburgh division of the Pennsylvania system. In order to facilitate the filling operations a temporary wooden pile trestle filled with rip-rap was constructed. The trestle paralleling the shore line for filling, as shown on the general plan herewith, was located a considerable distance from the established harbor line, so as not to interfere with the construction of the dock and machinery foundations. After the cars had been unloaded the material was distributed by the track spreader. Approximately 1,000,000 cu. yds. of filling material was deposited, making the ground area 1,850 ft. long and 850 ft. wide.

The dock consists of a double row of 40-ft. reinforced concrete piles spaced 3 ft. on centers supporting a concrete superstructure heavily reinforced with 85-lb. rails. Reinforced concrete struts spaced 30 ft. on centers and supported on reinforced concrete piles 30 ft. long unite the dock face with the foundation walls for the rear leg of the unloaders. Expansion joints are placed at every fifth strut running longitudinally in the strut and across the face wall. The foundation wall of the unloader leg is parallel to an approximately 75-ft. distance from the dock face and is supported on three rows of reinforced concrete piles 30 ft. long spaced about 4 ft. on centers. Small rip-rap stone is deposited around these piles and the concrete laid, using the rip-rap as a base.

Reinforced concrete sheet piling of 10 x 12 in. sections was laid horizontally between the two rows of bearing piles supporting the dock face and the space between the rear wall and the dock face was filled with rip rap stone varying from shovel to derrick size, a temporary wooden trestle being used from which to handle the stone with a locomotive crane. After the rip rap was brought up to the lake level, the whole mass was pumped full of sand by means of a hydraulic dredge. The dock face is protected by wooden piles tied together with a 12 x 12-in. oak waling strip.

Back of the rear wall supporting the unloader leg there is a U-shaped ore trough which is carried on rip rap placed immediately back of the wall and filled with sand. The bottom of this trough is protected by steel rails laid so the top of the head is flush with the bottom of the trough.



PLACING CONCRETE IN STRUTS

Contract for the construction of the dock was awarded to the Great Lakes Dredge & Dock Co., the Cleveland plant of which is located in the west breakwater.

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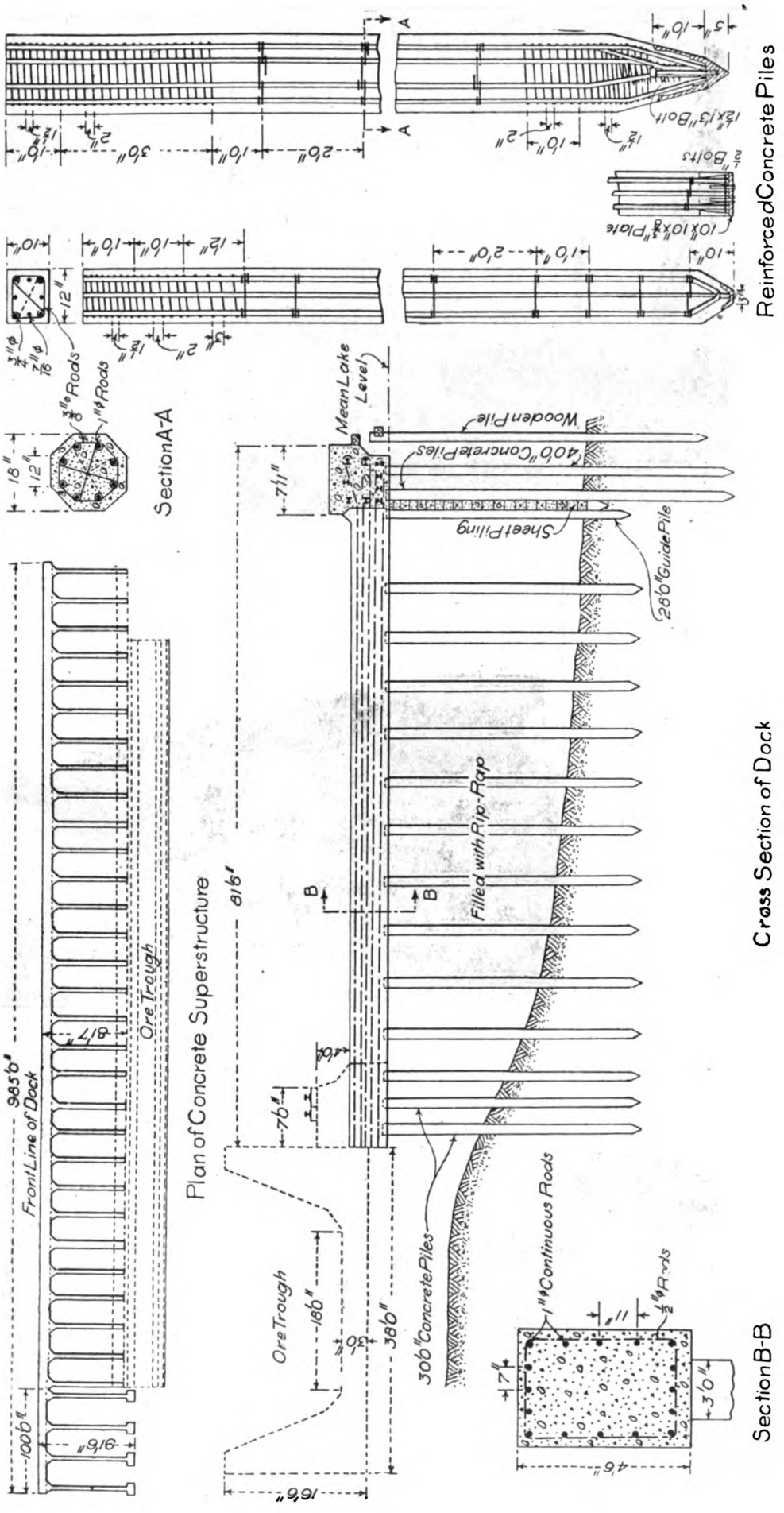

DETAILS OF CONSTRUCTION OF PENNSYLVANIA ORE DOCK IN THE WEST BREAKWATER AT CLEVELAND

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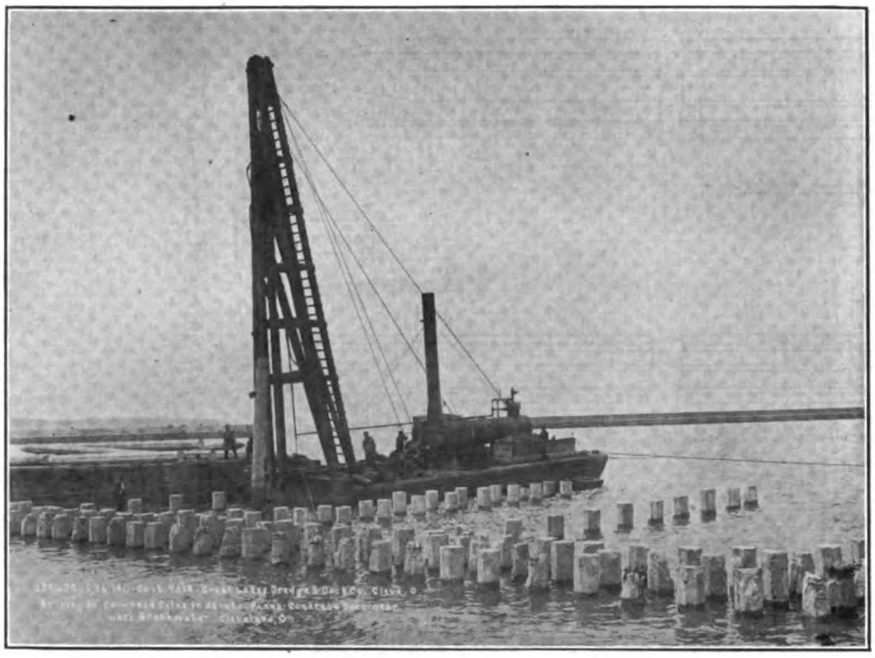
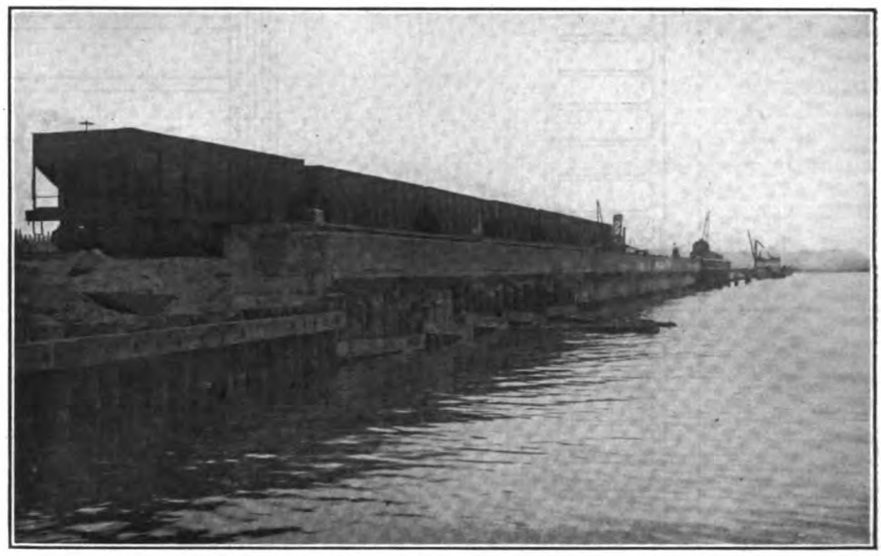


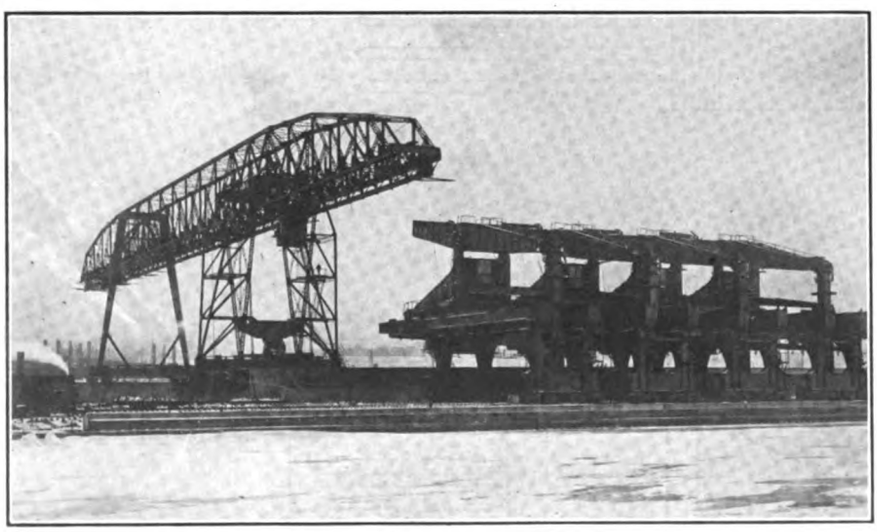
DRIVING 30-FT. CONCRETE PILES IN STRUTS

The first work done in the construction of the dock was to manufacture the concrete piles. The piles, octagonal in shape, reinforced with eight 1-in. steel rods, securely bound with ⅜-in. steel rods, were cast vertically in steel forms, a cast iron shoe being fitted into the form and becoming part of the finished pile. A 1:2:4 mixture of both gravel and broken stone was used. All material entering into the construction of the piles was received in cars and handled by locomotive cranes. As most of the piles were made during January, February and March, the materials as well as well as the finished piles, were kept heated. For heating the materials tunnels formed by interlocking steel sheet piling were placed under the piles of sand, gravel and broken stone, and steam pipes were placed in the elevated bin used in connection with the mixture. The water was also kept heated by a steam pipe. After the forms were filled they were laid on skids covered with tarpaulin and live steam was allowed to circulate around them. The forms were removed in from 12 to 24 hours after pouring, depending on the weather, but the piles were kept covered and heated for a considerable time after the forms had been removed.

The steel forms for the piles were held upright in front of a timber tower, within which a concrete hoist operated, bringing the mixed concrete from the mixer on the ground to a hopper above the mouth of the form. A locomotive crane handled the forms and the finished piles in the operation of casting. The number of octagonal piles manufactured was 625 in the 40-ft. length, 2,647 in the 30-ft. length, and 120 each of the 24-ft. and 20-ft. lengths. There were in addition 932 24-ft. 10 x 12 in. sheet piles and 210 28-ft. sheet piles of the same section. Each pile was numbered and a record kept of the date of manufacture, so as to guard against any pile being driven before it was at least 30 days old. The driving, however, was delayed by ice conditions and no trouble, therefore, was experienced with green piles.



THE DOCK FACE



THE HULETT UNLOADERS AND ORE BRIDGE

Piles ready for use were loaded into scows by a locomotive crane and were towed to the site where they were driven by floating pile drivers, no particular device being used to protect the head of the piles other than an oak driving block. The majority of the piles were put down without a great deal of hammering, but there was an occasional tough customer. For instance, a 30-ft. pile required 111 blows of a 5,000-lb.

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VIEW LOOKING WESTWARD DURING CONSTRUCTION

hammer falling 3 ft. 6 in. for the last foot of progress. A few other piles required almost as heavy hammering, but they did not suffer any appreciable damage except at the top in the part which is buried in the concrete superstructure.

No particular difficulty was encountered in the construction of the concrete superstructure. Traveling mixing plants were employed mounted on flat cars and scows. In both cases they were equipped with hoist towers from the top of which chutes were suspended to convey the concrete into the wall forms.

About 3,500 cu. yds. of concrete was placed in the dock struts and unloader walls. The bridge walls are supported on piles also, but the superstructure was placed after the filling had been made. The mixer for this work was also placed on a railroad car and supplied with material from other cars on the same track, laborers handling the material in wheelbarrows. The concrete was hoisted in a bucket and deposited in the walls through a chute, 5,900 cu. yds. of gravel concrete in the proportion 1:3:6 being placed. The Great Lakes Dredge & Dock Co. also constructed the foundations for the power house and the substructure for the Hickory street crossing.

The ore trough was constructed by the Dravo Contracting Co., of Pittsburgh.

The work undertaken by the Pennsylvania system also includes a complete trackage development on the made land, the construction of a double track subway under the seven tracks of the Lake Shore railway at Hickory street, and a system of electric locomotives for handling the cars under the unloading machines.

Contract for the ore handling equipment was awarded to the Wellman-Seaver-Morgan Co., of Cleveland. The machinery equipment consists of four 17-ton Hulett unloaders and a 15-ton ore stocking and rehandling bridge. It is represented that when finished it will be the most complete ore-handling plant so far constructed on the lakes. It is expected to be ready for operation at the opening of navigation this season.

The unloaders are arranged along the face of the dock and are used for unloading the ore from boats lying alongside the dock, and loading into cars for direct shipment, or transferring the ore to a pit at the rear end of this machine, where it is within easy reach of the bridge, to be rehandled and placed into storage piles. From these storage piles it may then be rehandled by the bridge and loaded into cars for transport to furnace plants. The ore, whether loaded into cars directly from the boat or by means of the bridge, after having been in storage, is handled through scale hoppers which accurately weigh the ore, as it goes into the cars, so that a complete record of the ore handled by these machines, either by the unloaders or the bridge is made without the use of track scales. The Hulett unloaders are massive machines in every way. They consists of a heavy framework mounted on wheels, which travel along the runway rails next to the face of the dock. The runways of these machines are spaced about 71 ft. centers, the main framework spanning tracks located beneath the machine. The rear end of the main framework is extended beyond the back runway a distance of about 57 ft., this back cantilever overhanging an ore pit into which the ore is discharged, to be later rehandled by the bridge and placed in storage. The upper part of the main frame is provided with rails upon which a trolley travels. This trolley carries a walking beam from the outer end of which is suspended a vertical stiff leg with the bucket at its lower end. This bucket leg is mounted on a pivot which is carried on the trolley. The forward end of the walking beam with the bucket leg attached is heavier than the rear portion of the walking beam, so that the bucket will descend by gravity. The motion of the walking beam is controlled by means of ropes attached to the rear end of the trolley, and the walking beam operated by an electric motor at the back end of the walking beam. The length of this leg and walking beam is such that the ore can be reached in any part of the boats, which are engaged in the ore handling traffic.

GENERAL VIEW LOOKING WEST ON PILE DRIVING

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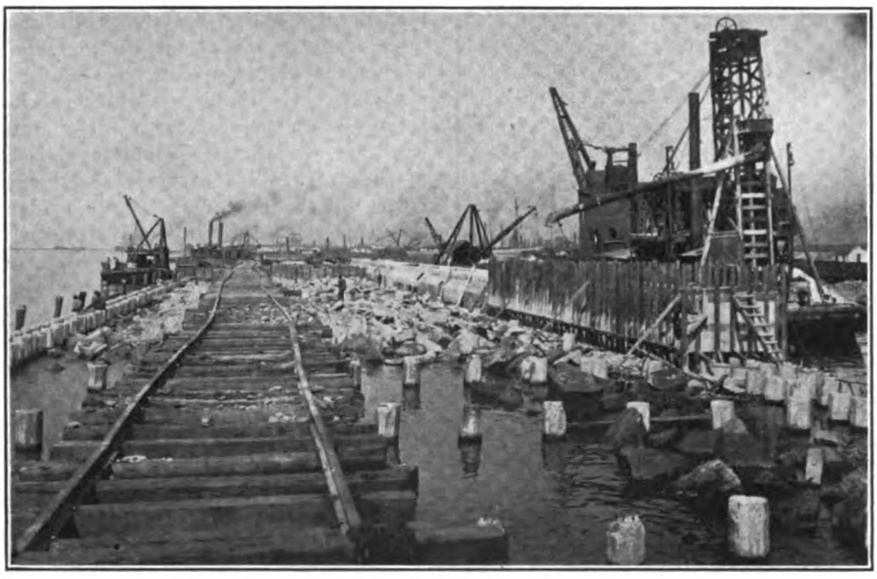


GENERAL VIEW LOOKING EASTWARD DURING CONSTRUCTION

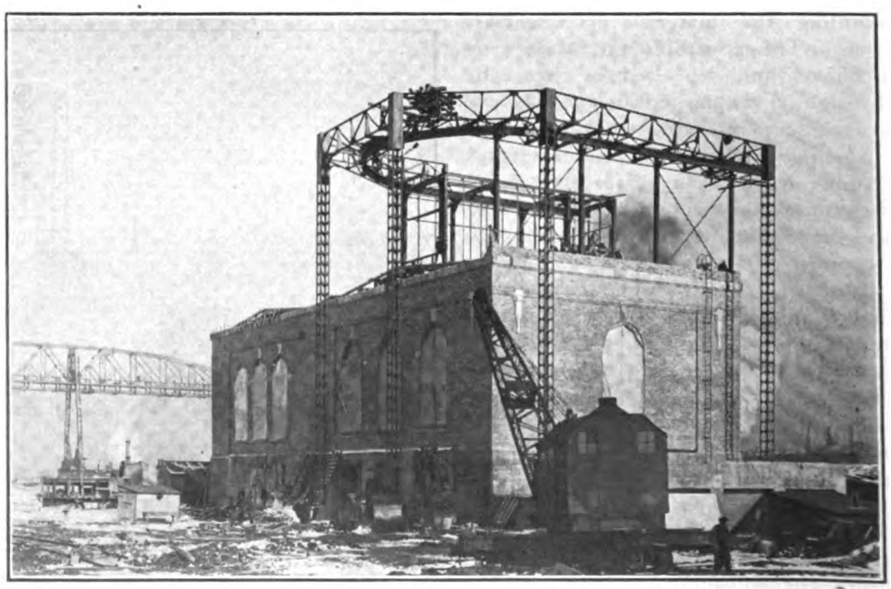
The bucket at the bottom of the leg has a capacity of 17 tons of ore and is directly controlled by an operator who travels with the bucket in a small cab located in the bottom of the leg, directly over the bucket. This bucket leg is suspended from the walking beam on a swivel bearing, which enables the leg to rotate in a complete circle. From his position in the bucket leg, the operator controls the motions of raising and lowering the bucket, rotating the bucket leg, opening and closing the bucket and traversing the trolley in and out. After the bucket fills itself in the hold of the boat it is raised out of the hatch and the trolley is traversed back until the bucket is in position to discharge its contents into an ore hopper, which is supported in the main framework of the machine. This hopper has a capacity of 70 tons of ore and is provided with discharge gates at the bottom. These gates are of the disk type and are operated by means of an electric motor and discharge the ore into a scale larry which travels on tracks suspended from the under side of the main framework. This larry is controlled by an independent operator who travels with the larry.

The larry bin has a capacity of 50 tons of ore. This bin is carried on scales which have a recording beam in the operator's cab. After loading the scale larry from the 70-ton bin, the larry operator, after weighing the ore, moves the larry over a car track upon which the cars are standing and into which he desires to discharge the ore. Having full control of the scale beam, the operator is enabled to discharge into the car any predetermined amount of ore up to the capacity of the larry, the larry being provided with gates at the bottom of the bin which are arranged to cut off the flow of the ore, after any desired amount has been discharged. If the ore taken from the boat is not going into cars for direct shipment, the larry is filled from the main hopper and discharged into storage pit at the back end of the machine, where it may be rehandled by the bridge. These unloaders are electrically operated throughout, the current for the operation being taken from the conductor rails located along the runway of the machines. The current from these rails is taken off by means of sliding shoes, which are carried on the machine.

The machine is traveled along the runway by means of a motor which is geared to the trucks. This motor is mounted on a platform in the main framework of the machine and is also used for driving the ore gates in the 70-ton hopper, into which the bucket discharges. This motor is of mill type and has a rating of 150 h. p.

The scale larry is mounted on an incline track suspended from the framework and is traversed along this track by means of a motor which operates a drum upon which are wound haulage ropes, the other ends of which are attached to the rear end of the machine. This motor is mounted on the framework of the larry and has a rating of 150 h. p. The larry gates are operated by a separate motor, also suspended in the larry framework. This motor has a rating of 35 h. p. and operates the undercut gates on the larry bin through a worm gearing reduction.

The trolley carrying the walking beam is traversed back and forth on top of the machine by means of a rack and pinion. The racks are attached to the main girders of the machine and the pinions are carried on the trolley. The pinions are driven by means of a 100-h. p. motor mounted in the framework of the trolley. This motor is controlled by the operator in the bucket leg. The walking beam carrying the bucket is operated by means of ropes attached to the rear end of the walking beam which wind upon drums driven by a 300-h. p. motor, mounted on the beam. The machinery for opening and closing the bucket is also carried at the rear end of the walking beam and consists of a 100-h. p. motor geared to a drum upon which the operating ropes are wound. The ropes from this drum are carried from the walking beam over deflecting sheaves at the top of the bucket leg and attached to an operating mechanism located in the leg above the



THE POWER HOUSE

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operator. This mechanism is connected to the operating arms and segments in the buckets by means of heavy flat link chains.

The machinery for rotating the bucket leg is mounted next to the bucket mechanism in the walking beam and consists of a 35-h. p. motor geared to a drum upon which the rotating ropes are wound. The ropes from this drum are carried through the walking beam and connected to a rotating segment at the top of the bucket leg.

The speeds of this machine are so regulated that a round trip is possible in approximately 50 seconds and the capacity of the four machines working under favorable conditions would be between 35,000 and 40,000 tons per day, double shift.

The 15-ton rehandling stocking bridge which travels along the storage yard at the rear of the unloaders, has a span of 266 ft. with cantilevers overhanging the span, of 173 ft. at each end, making a total overall trolley travel of approximately 581 ft.

The Ore Conveying Bridge

The front runway of the bridge is located 168 ft. back of the rear runway of the unloader, and the length of cantilever is such that the bucket is able to reach ore in the pit at the rear of the unloaders. The bridge is carried on a tower at the forward end of the span and the shear leg at the rear of the span. These supports are flexibly connected to the bridge so that it is possible for the bridge to adjust itself to unevenness in the track, without producing undue strains in the structure, and it is also capable of swivveling through a slight angle on either side of the central position.

The lower side of the bridge supports a runway for the bucket handling trolley. This runway extends the entire length of the bridge structure, including span and cantilevers.

The trolley which carries the excavating bucket is of the self-contained type, having an operator's cab suspended from the trolley framework and in this cab are located the controllers for operating the different motions of the bucket, such as opening, closing and hoisting, as well as cross-traversing the trolley.

All of the ore from the pit at the rear of the unloaders is handled by this bucket and carried back into the storage piles under the cantilevers and span for storage purposes. When the ore is required from this storage it is rehandled by means of the bucket and discharged into a receiving hopper built into the framework of the main tower. This hopper has a capacity of 75 tons of ore and is provided with discharge gates at the bottom for dumping the ore into a scale hopper located beneath these gates. This scale hopper is suspended from the tower directly over a loading track, upon which railroad cars will stand when receiving ore. The bottom of the weighing hopper is provided with gates which are exactly similar to those used on the scale larry of the unloader. The scales are provided with recording beams so that accurate weights may be recorded and the gates are of the cut-off type, which enable the weigh master to discharge any predetermined amount of ore into the cars standing on the track beneath.

The tower and shear leg of the bridge are mounted on trucks which travel along the runway rails.

Electrically Operated

The driving trucks are connected by gearing and shafting to the bridge travel motors. Separate motors are provided for driving the tower and shear leg. These motors being 75 h. p. are mounted on the sills and the controllers located in the bridge operator's house, suspended from the bridge at main tower. This operator's house is so located that the trolley operator can move the trolley opposite the house and step from the cab to the house. The motors are provided with electric brakes for locking the driving trucks when the bridge is not in motion. These brakes are automatically operated and set as soon as the car is cut off of the travel motors.

This bridge is electrically operated throughout, the current being obtained from feed rails which are located along the bridge runway and taken off by means of sliding contact shoes, which are carried on the bridge.

The bucket which is suspended from the trolley has a capacity of 15 tons of ore. This bucket is operated by means of ropes wound on drums in the trolley. The opening and closing ropes are wound on separate drums operated by separate motors. These motors are provided with dynamic braking attachment, so that the operator has full control of the lowering of the bucket either loaded or empty, without the use of mechanical brakes.

The trolley is traversed by means of two 75 h. p. motors which are geared to the trolley axles. These motors are also operated by magnetic control boards, the master controllers being located in the operator's cab. The trolley is provided with a dynamic braking attachment for controlling the motions of the trolley and also with emergency air cylinders which operate mechanical brakes. Each end of the trolley runway is provided with heavy spring bumpers, which prevent the trolley from running off the end of the bridge.

The speeds of this machine are as follows: Hoisting, 175 ft. per minute; cross travel speed of the trolley, 600 to 800 ft. per minute; travel of the bridge along runway, 50 to 75 ft. per minute.

Under favorable conditions when operating at these speeds, the bridge will be capable of handling approximately 1,000 tons per hour.

The dynamic braking attachment applied both to the hoist and trolley motions, is also applied to the various motions of the unloader and is especially desirable in connection with the safe and accurate handling of heavy loads. It is accomplished by causing the motors to act as generators, thus producing retarding effect which is proportionate to the resistance in the line and by varying this resistance it is possible to secure accurate control of the moving load, without depending upon mechanical devices in any way.

C. O. Bartlett & Snow Co.

The C. O. Bartlett & Snow Co., of Cleveland, has just increased its capital stock to $500,000. This business was founded about 25 years ago by C. O. Bartlett, making oat meal, barley pearling and general mill machinery in a small way. The business, however, expanded with the years and with the natural development of the country until today the company occupies a prominent position as engineers and manufacturers of all kinds of elevating and conveying machinery, coal tipples and coal-handling machinery for mines and docks, scows for fueling lake vessels and ash-handling machinery, as well as mechanical dryers and crushed stone, gravel and sand-handling and washing plants. The company has also built up in recent years a large export trade with Mexico, Canada and South America. The increased capital is intended to extend the company's plant. The officers of the company are C. O. Bartlett, president; E. J. Neville, first vice president and general manager; H. H. Bighouse, second vice president; H. L. McKinnon, third vice president, and I. M. Snow, secretary.

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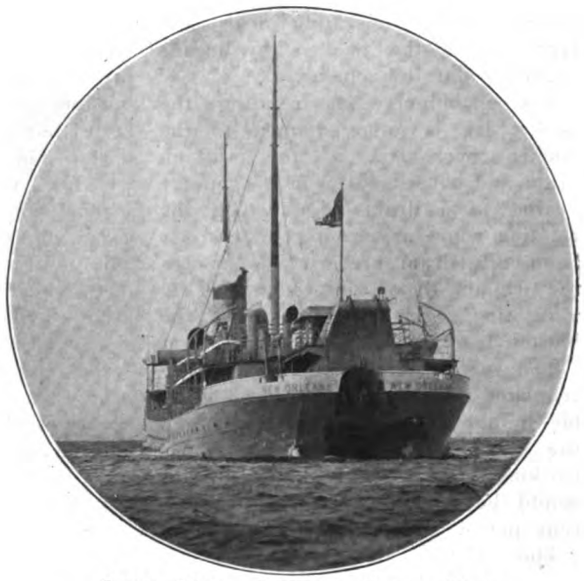
Suction Dredge New Orleans

The First Dredge of the Fruhling Type to be Employed by the Corps of Engineers. Its Novelty Lies in the Type of Head. Intended for Use in Southwest Pass. This Type of Dredge has met with much Success in Other Parts of the World

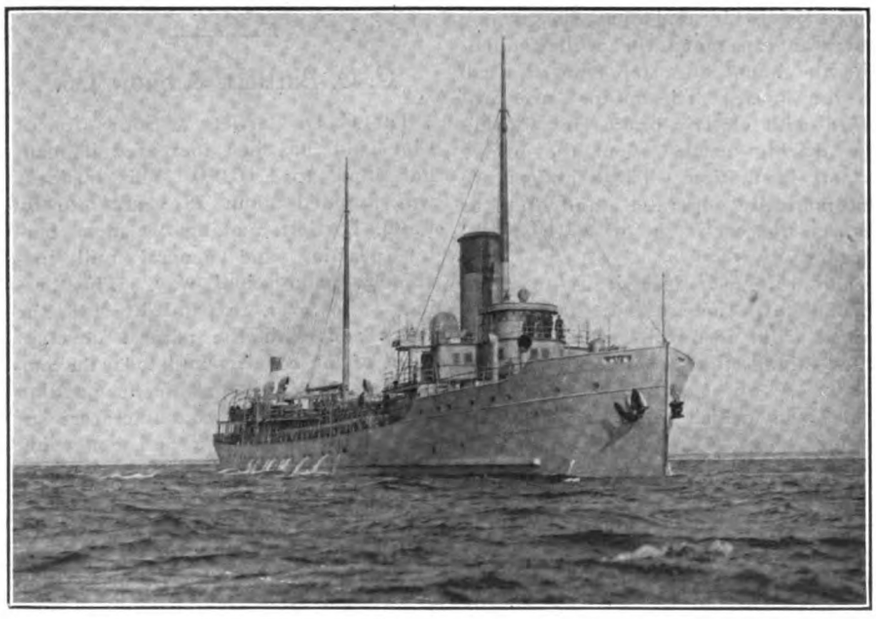


STERN VIEW, SHOWING DREDGE HEAD

THE New Orleans is a large steel, twin-screw suction dredge of novel type, designed for use in the southwest pass of the Mississippi river. This dredge was built for the United States corps of engineers, war department, and is of the Fruhling suction head type, so successfully used in Europe and Canada, where dredging conditions are similar to those of the Mississippi passes, and is of the following dimensions:

Length over all (not including dredge head), 315 ft.; Length between perpendiculars, 300 ft.; breadth molded, 50 ft.; depth molded, 26 ft.; length of hopper, 93 ft. 9 in.; capacity of hopper, 3,000 cu. yds.; maximum dredging depth, 50 ft.; minimum dredging depth, 21 ft.; draught loaded, 20 ft.; coal bunker capacity, 300 tons; speed loaded, 10 knots.

The most novel feature of the dredge is the type of head, which was described in THE MARINE REVIEW, January, 1912. It is practically a huge enclosed rake, some 18 ft. wide by 5 ft. fore and aft, serrated along the edge with sharp cutting teeth through the incisors of which is ejected high pressure water to aid in disintegrating the spoil and make it of suitable consistency to be sucked through duplicate suction pipes into the pumps from which it is deposited in either of the ten hoppers. These hoppers have a combined capacity of 3,027 cu yds., or approximately 3,000 tons, and can be filled under favorable conditions in the remarkably short space of 30 minutes. The dredged material may then be transported by the vessel to any convenient dumping ground at a speed of 10 knots per hour, when by the manipulation of four hydraulic ram mechanisms the hopper doors, 20 in number, and opening outwardly through the ship's bottom, may be operated either individually or simultaneously for discharging. Should it be desired to utilize the dredged material for reclamation work, a swivel deck discharging pipe has been installed, to which the necessary lengths of shore piping may be coupled, and through this pipe the dredge can discharge her own cargo by sucking it from the hoppers and ejecting it to any location desired, or, as a third alternative, into scows or other hoppers alongside.



THE NEW ORLEANS DREDGING SAND, ON TRIAL OFF PROVINCETOWN

The machinery consists of four sets of triple-expansion, inverted, marine type engines, arranged in pairs, tandem, and built on common bedplates. The two after sets of these main engines are coupled together to the propeller shafting and the two forward sets to the 26-in. centrifugal pumps used for dredging. By an ingenious arrangement of clutches, the propelling and pumping engines can be coupled together so that the full power of all four engines can be exerted on the twin propellers when desired, while when dredging, the after sets will be free to drive the propellers and the forward sets will drive the dredging pumps, steam being supplied by four Babcock & Wilcox Co.'s boilers.

The New Orleans furnishes comfortable and commodious quarters for its crew. The captain, inspector and first mate are berthed in a large deck

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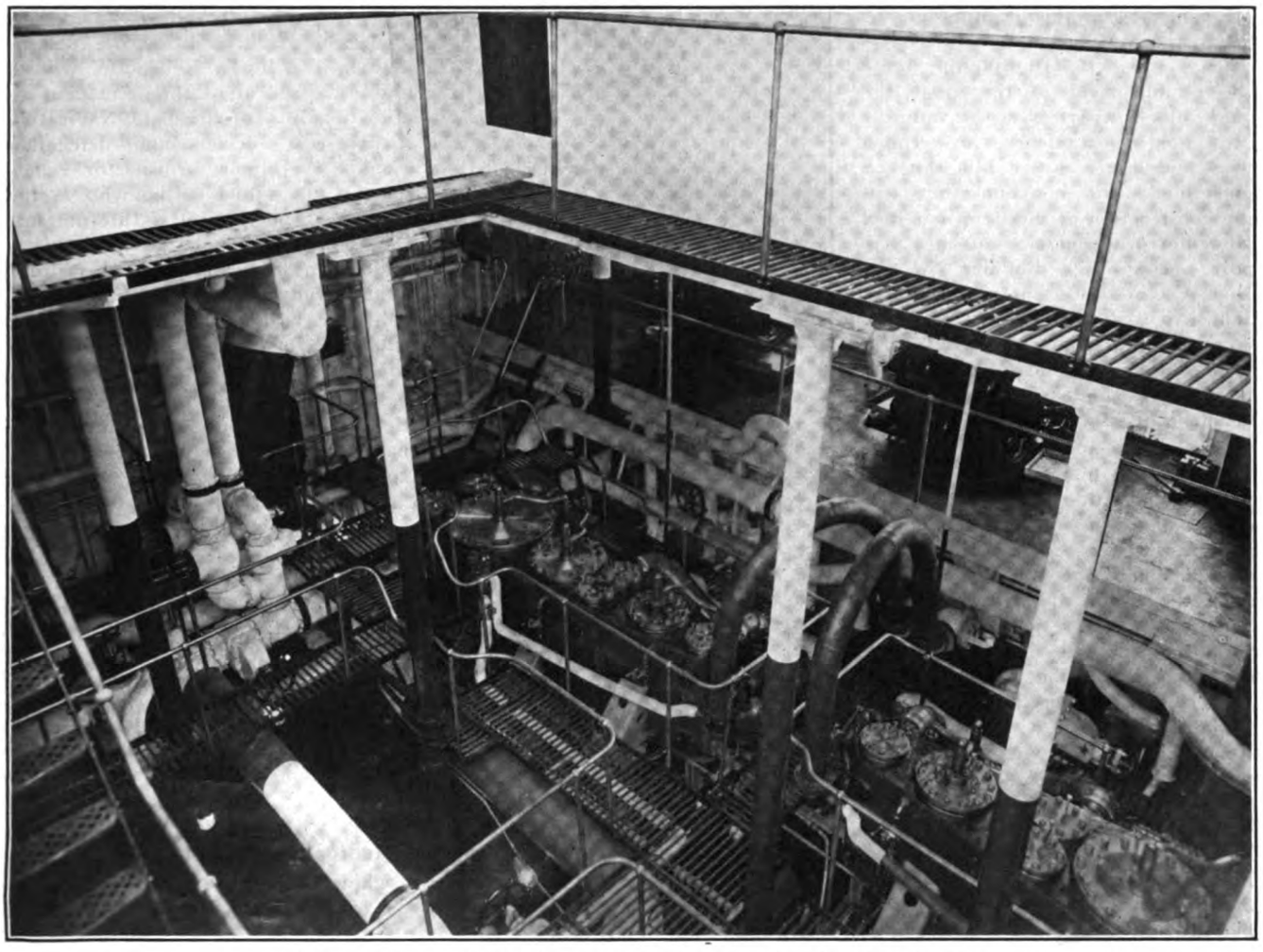
house, while the chief engineer and his assistants have been accommodated in the after deck house and adjoining the engine room. The after deck house is also arranged for stewards, cooks, etc., and provided with suitably furnished mess rooms for officers and petty officers, together with toilets, wash places, etc. On the lower deck aft on each side of the well are mess rooms for seamen and firemen, cold storage rooms and refrigerating machinery. The monkey forecastle is divided off into quarters for seamen, firemen, oilers, storerooms, wash places, carpenters' workshop, etc., while nearby are located the quartermaster and boatswain. As the New Orleans will operate mostly in semi-tropical waters, the greatest attention has been paid to the sanitary and ventilation arrangements, and all living quarters and machinery places are well supplied with both artificial and mechanical ventilation.

In addition the vessel is lighted throughout by electricity and is fitted with a very powerful electric searchlight and a steam heating system is installed with individually operated radiators in every living room on the vessel.

St. Thomas and the Panama

Brief notices have already appeared respecting the intention of the Danish government to place the West Indian island of St. Thomas in a position to avail itself of the advantages which must accrue to it by the opening of the Panama canal to maritime traffic. The bill asked for powers to grant a concession to a syndicate just formed for carrying out the necessary works for laying down a free harbor in the said island. The concession (to cover a period of 99 years) includes the sole right of constructing docks of a modern type, together with store houses and packing houses in the harbor, and the ultimate intention is to create an extensive free zone—including the island of St. John as well as that of St. Thomas—into which merchandise of all descriptions shall be admitted duty free. The syndicate, on its part, will be bound to hand over to the Danish state one-third of the quay dues and other charges on shipping which it will be authorized to levy. On introducing his bill into parliament, the minister of finance explained that after the opening of the new canal (probably in the year 1914) the importance of Danish insular possessions in the West Indies will increase enormously, St. Thomas lying directly in the route which will be taken by the shipping traffic from Europe through the Panama canal to the west coast of America, and this traffic will assume extraordinary dimensions. Not only that, the Panama canal will also come into competition with the Suez canal as far as regards the shipping trade between Japan and North China and the east coast of America, and, the minister of finance pointed out, the large steamers which will be put into the Panama canal traffic will probably not find it convenient to stop for discharging at all the different ports, but rather to tranship at St. Thomas, which would then become a rival of New York. The works in contemplation at St. Thomas are of colossal proportions.



VIEW OF ENGINE ROOM, SHOWING ONE OF THE TWO SETS OF ENGINES

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Death of Walter A. Post

Walter A. Post, who succeeded the late Calvin B. Orcutt as president of the Newport News Ship Building & Dry Dock Co., in February, 1911, died very suddenly at Newport News, Va., on Feb. 12. He was born at Kingston, N. Y., Jan. 7, 1857, and was of English ancestry. His first engineering work was in the employ of E. I. White, in 1880, who at that time had the contract for the terminal improvements of the Chesapeake & Ohio railway, at Newport News, Va. He remained in this position for ten years and was engaged in this work when Collis P. Huntington began the establishment of the great ship yard at Newport News. Naturally, Mr. Post's experience in terminal work peculiarly fitted him for engineering work in connection with the construction of the new ship yard. He entered the employ of the Newport News Ship Building & Dry Dock Co. in 1890 as its civil engineer, and in that capacity had charge of the erection and equipment of the entire plant, carrying it out so satisfactorily that in 1898 he was made general manager of the company.

The success of the Newport News company is history. It has built nearly one-fifth of the battleship construction of the United States navy, as well as a great number of splendid merchant ships. As stated, upon the death of Mr. Orcutt, Mr. Post was made president of the shipyard. His activities, however, were not altogether confined to ship building. He was also president of the Old Dominion Land Co., the Newport News Light & Water Co., the Citizens Railway, Light & Power Co., the First National Bank of Newport News, and a director of the Newport News & Old Dominion Railway & Electric Co. He was a member of the American Society of Civil Engineers, Society of Naval Architects and Marine Engineers, The Engineers' Club of New York and the New York Railroad Club. He was also a Fellow of the Royal Astronomical Society of London.

WALTER A. POST

Congress of Navigation

Reports which are being received from European countries regarding the appointment of delegates to the Twelfth International Congress of Navigation, which will convene in Philadelphia on May 23, indicate that the attendance will be in excess of expectations, and that the congress, including the American attendance, will in all probability be the largest ever held.

Besides the official delegates from the various countries, a large number of foreign engineers will attend the congress in a non-official capacity. Germany will unquestionably send the largest single delegation and this will include in round numbers, 100 engineers. These will represent the leading thought in Germany on all engineering subjects that have to do with water-borne commerce. One or two names alone are sufficient to indicate the character of this delegation. It will include Herr Johann Friedrich Bubendey, head of the Hamburg harbor works, the most notable in the world. Herr Bubendey is recognized throughout the world as an authority of the highest standing. Among other members of the German delegation are Georg de Thierry, who is a member of the Suez commission of consulting engineers, and Dr. Leo Sympher, an inland waterways expert, known throughout the world.

Already about 85 German engineers have signified their intention of attending the congress and others will unquestionably be added.

The second largest delegation will be that from France, which will number considerably more than half as many as the delegation from Germany. The head of the delegation, M. Vetillart, is inspector general of roads and bridges. M. Vetillart is a doctor of science of the University of Pennsylvania. Among other distinguished French authorities are M. Charguerand, state councilor, who is director of roads and navigation at the ministry of public works, and M. Mahieu, a noted authority on the subject of roads.

Great Britain will send among its delegation Lieut. Col. H. A. Yorke, chief inspector of railways, a world famous railway authority.

Belgium will send a large delegation headed by G. Helleputte, who is the first president of the Permanent International Association of Navigation Congresses. Included in this delegation also is A. Dufourny, inspector general of bridges and roads, who is the second president of the International Association. Mr. Dufourny is a widely known waterway and railroad expert who some years ago was sent to China at the request of Li Hung Chang to make an investigation into the railroads of that country.

Included in the Hungarian delegation is M. Zolton de Kohanyi, chief naval inspector of the ministry of commerce.

Russia will send a large delegation headed by M. V. E. de Timonoff, a distinguished engineer of ways of communication. Another distinguished engineer of this delegation is E. F. de Hoerchelmann.

The Swedish delegation will include Colonel Frederick Wilhelm Hansen, of Stockholm, president of the Royal Administration of Hydraulic Power.

Reorganizing Seattle Dock Co.

Philip D. Sloan, who for the past five years has operated the shipyard of Sloan Bros. & Co., at Seattle, is at present on the lakes interesting capital in the construction of a new floating dry dock at Seattle. The plans call for a dry dock with steel sides and wooden pontoons capable of lifting 8,000 tons. Mr. Sloan's purpose is to reorganize the Seattle Dry Dock Co. to operate the plant, having a capital stock of $1,000,000, of which $400,000 will be preferred and $600,000 common. It is understood that Mr. Sloan has already sold the majority interest in preferred among lake men. It is the intention to begin work upon the dock at once and to have it in commission by Jan. 1 next year. Mr. Sloan was formerly in the shipbuilding business on the lakes.

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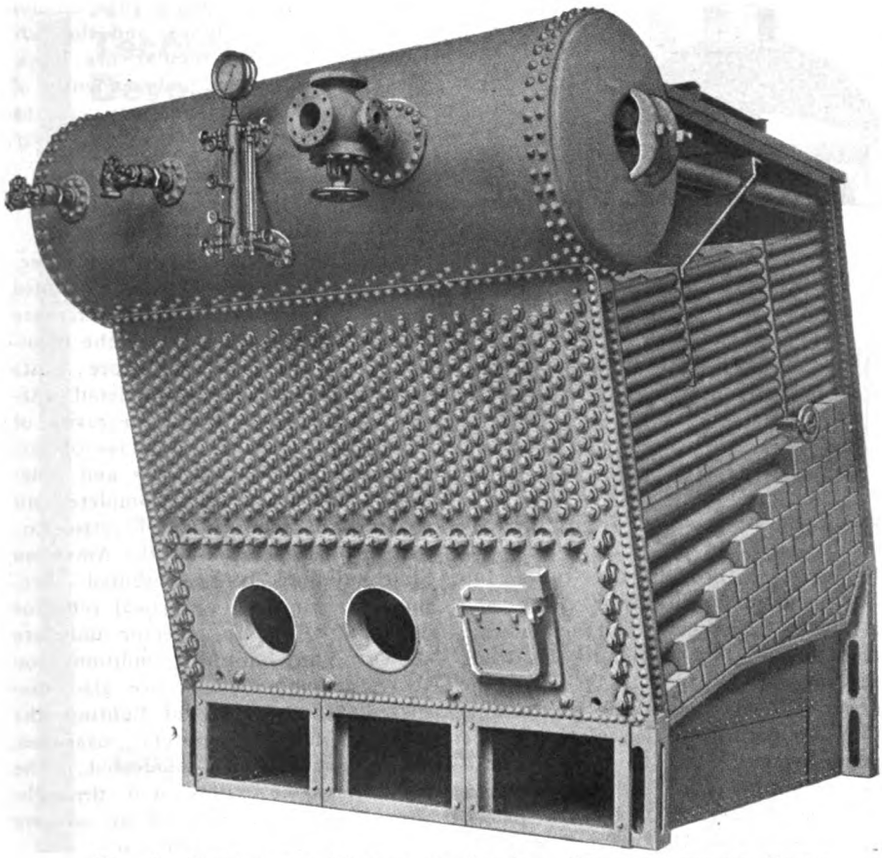

FIG. 1—ADAPTED FOR VESSELS OF LIMITED HEIGHT BETWEEN DECKS

A New Marine Water-Tube Boiler

The water tube marine boiler, shown by the accompanying photographs, is an entire departure from the generally accepted type, as the numerous headers and expanded nipple connections are eliminated. There are absolutely no joints or connections except the ends of the generating tubes, which are expanded into the water legs or flitches.

These boilers are built in two types and of varying sizes to meet requirements. Fig. 1 is particularly adapted for vessels of limited height between decks and moderate forced draft. The steam and water drum is located over the front flitch and at the low end of the tubes. Circulation is provided for by large openings in the bottom of the drum, registering with the rectangular passages in the water legs, delivering to the generating tubes an ample supply of water. The return from the upper flitch to the drum is through the top row of 4-inch tubes.

Fig. 2 has much larger passages for the circulation, and is designed for forced or natural draft and the greatest economy, having super-heater and feed water heater. As seen from the photograph, the drum is in the front or the high side, the upper portion of the front flitch is enlarged where it is riveted to the drum; this chamber is divided by a diaphragm into two parts, one of them forming a passage from the drum to the large down-flow tubes, the other receiving the ends of the generating tubes, thus completing the circulation and delivering above the water line in the drum.

The water legs, or flitches, are constructed of steel plates, ¼ in. in thickness, forming the tube and hand-hole sheets. These sheets are spaced about 3½ in. apart, stayed to each other by improved and patented continuous stays, dividing the water leg into a number of rectangular passages, as shown in Figs. 3 and 4.

T-shaped retaining grooves are milled in the tube and hand-hole plates approximately 6 inches from center to center. In these retaining grooves are fitted, in sections, a continuous I-shaped stay plate connecting the two sheets, thus forming the rectangular passages shown in Figs. 3 and 4.

This construction is much stronger than any other method of supporting flat surfaces, as the connection is practically a continuous line, and the load per inch of stay is equal to the distance from center to center of the stays, multiplied by the working pressure, or only 1,800 lb. per lineal inch for 300 lb. of steam—compared with 10,800 lb. per stay for the usual method of staybolting on 6-in. centers. Expansion and contraction is provided for by the flexibility of the stay plates, and the movement of the stay in the retaining grooves. The trou-

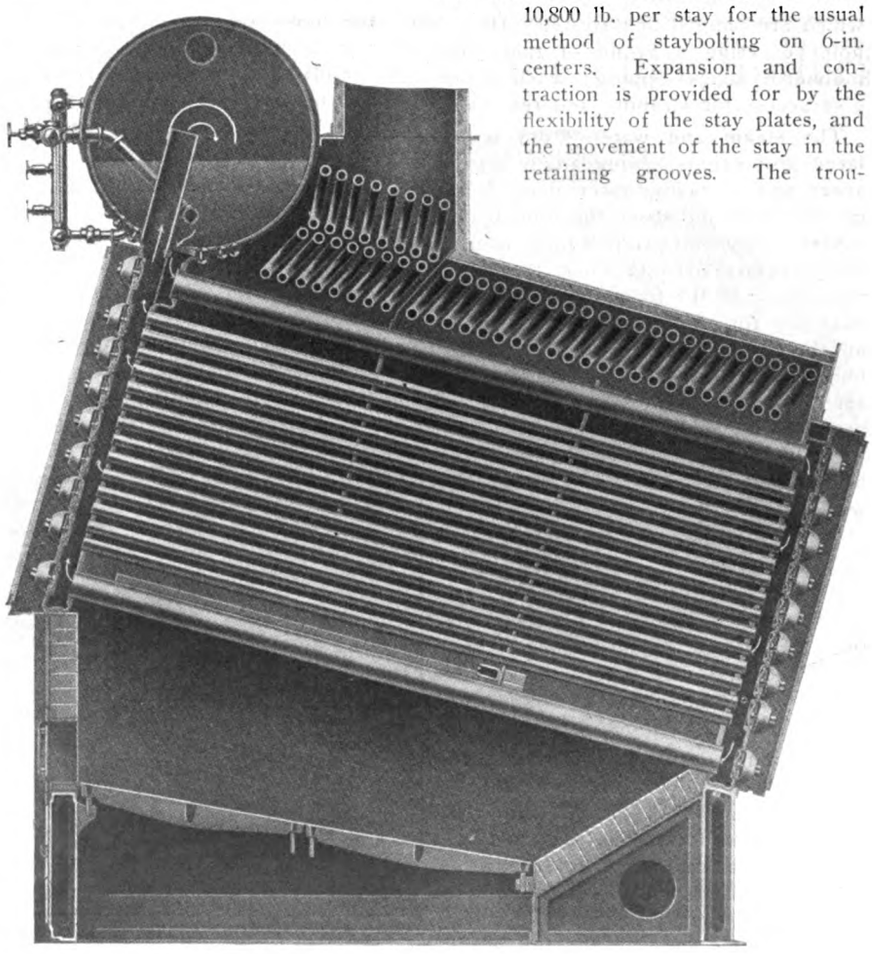

FIG. 2—DESIGNED FOR FORCED OR NATURAL DRAFT

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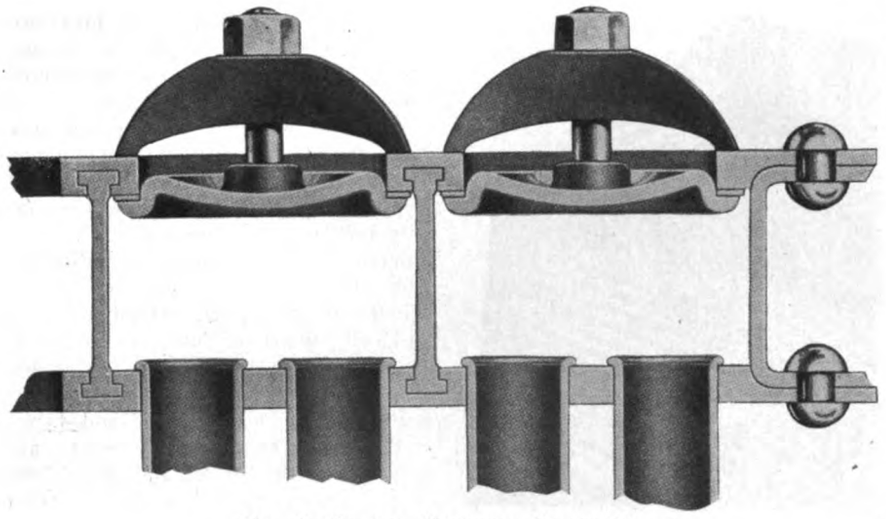

FIG. 3—SECTION THROUGH BOILER HEADER

blesome question of leaky and broken staybolts is entirely eliminated, as there are no screwed or riveted stays in the boiler—no holes through the plates, there cannot be any leaks from this cause.

Each header, or flitch, in the moderate sizes, is constructed of one plate, folded through the center—see Fig. 2—the edges channeled, flanged or lapped and riveted, eliminating, as far as possible, all riveted joints, except the connections to the steam drum, which are flanged and riveted. Handholes covering a group of tubes, or individual plugs opposite each tube, give access for cleaning and renewals.

The steam and water drum is of large proportions, giving ample steam space and a steady water line. It is composed of one sheet, the joint being a very heavy butt strap, which insures the necessary strength where the drum connects with the front flitch, as large passages for circulation are provided at this point. The drum heads are bumped and fitted with man-hole at each end. The butt joints and heads are double riveted—all rivet holes drilled in place after the work is fitted, insuring fair holes and tight work.

The generating tubes are 2-in. outside diameters of extra heavy gage. The length is varied as required, depending on conditions. The down-flow tubes are 4½ in. outside diameter and No. 6 B. W. G. All tubes are expanded into the tube plates and the ends flared.

Feed water and super-heaters are furnished for either design, when desired. As shown in Fig. 2, the feed water heater, located in the up-take is of the long flow type, and consists of three headers with U-shaped tubes, the open ends expanded into the headers—the water entering the top header, travels through the tubes full width of the boiler four times, and is finally conducted by the internal feed pipe to the bottom of the drum, discharging through jets into the down-flow passage of the front flitch, thus increasing the circulation. The super-heater is of the same general construction as the feed water heater, with a shorter flow, and is placed over the top of the down-flow tubes as shown in Fig. 2. Ample provision for expansion, cleaning and renewals of the feed and super-heater tubes insures the most efficient and satisfactory results. By-pass valves are fitted on the heaters, permitting either, or both, to be cut out in case of emergency.

The casing is sectional and lined with asbestos fire felt 2 in. thick. The furnace in Fig. 1 is entirely surrounded by the large side tubes and the flitches. The furnace door openings are circular and welded into the plates. Special fire brick, formed to fit around the outside of the side tubes, form the sides of the casing, and are held in place by the sectional casing. In Fig. 2, the flitches do not extend below the tubes, and the furnace walls are of regular fire brick. The boiler is carried independently of the furnace walls, and they can be rebuilt without disturbing either boiler or casing.

Marine Lighting

Clark Baker, of the Brilliant Electric Co., Cleveland, O., has compiled in bulletin form data with reference to marine lighting, in which the illumination of modern steel ore boats especially is considered in detail. Attention is called to the necessity of equipping lamps for this class of service with suitable reflectors and a detailed description of a complete unit designed by the Brilliant Electric Co., with the co-operation of the American Ship Building Co., is presented. Sectional drawings of a vertical reflector unit and an angle reflector unit are shown. The lighting conditions on board passenger boats are also discussed and methods of lighting the cabins, officers' quarters, passages, staterooms, etc., are suggested. The bulletin is well illustrated throughout. It may be obtained by writing to the Brilliant Electric Co.

The Eastern Steamship Corporation, pier 14, North River, New York, is making quite a number of changes in the passenger steamers Massachusetts and Bunker Hill, involving the installation of oil-burning apparatus, providing an enlarged and outside improved dining room on the main deck and a hurricane deck cafe. As the dining room has hitherto been on the extreme upper deck forward the change will make possible the addition of a number of desirable outside staterooms. The ships will also be painted white. They have hitherto been painted black. The work is being done by Cramp's, Philadelphia.

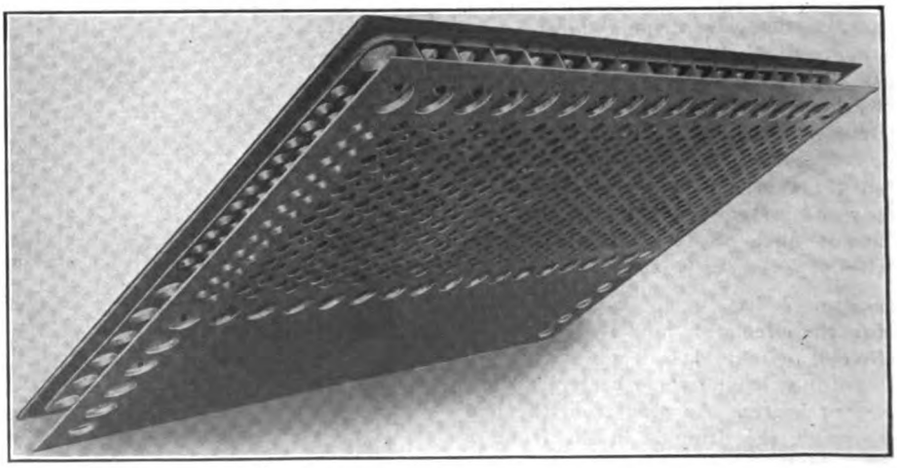

FIG. 4—FORMING RECTANGULAR PASSAGES

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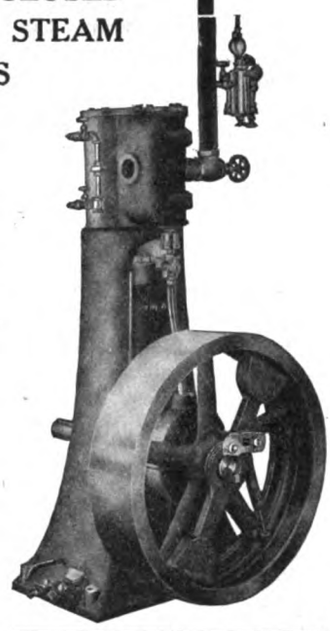

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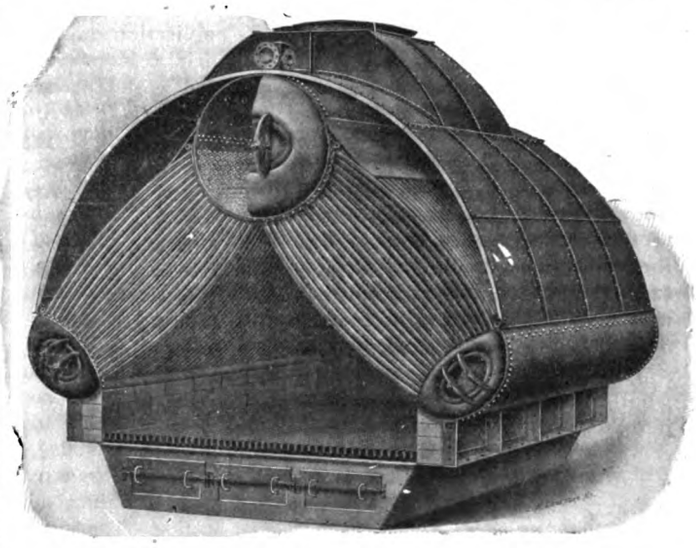

Adapted for the highest grade service, Torpedo Boats, Destroyers, Battleships, and large commercial vessels. Steam drums up to six feet in diameter, larger water and steam room capacity than any other boiler.

Any tube can be replaced without disturbing any others. Fifty tubes removed through one hand-hole. Curvature of tubes just sufficient to avoid expansion troubles. Greatest facility for cleaning interior and exterior of tubes. No screwed joints, all tubes expanded. All parts of wrought steel. Send for catalogue.

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Chicago's Demand on Lake Water

The sanitary district of Chicago is seeking to divert 10,000 cu. ft. of water per second, or one-seventh of the total discharge from Lake Superior, through the drainage canal by means of the Chicago and Calumet rivers. Application for this diversion is now before the secretary of war, and on Feb. 28 a general meeting was held in the secretary's office to listen to arguments for and against the proposition. Those present on behalf of the application were John C. Williams, attorney for the sanitary district of Chicago; George N. Wisner, chief engineer for the sanitary district; James A. Smith, president, Thomas M. Sullivan and James J. Healy, trustees for the sanitary district; Judge Stephen A. Foster, E. C. Lindley, former attorney for the sanitary district; Lawrence McGann, commissioner of public works; Dr. A. B. Young, health commissioner city of Chicago, and Lyman A. Cooley, civil engineer, representing the city of Chicago. Those present in opposition to the application were William Livingstone, president of the Lake Carriers' Association; Harvey D. Goulder, counsel for the Lake Carriers' Association; H. V. Ford, representing the package freight lines; A. C. Sullivan, of Chicago; George H. Eichelberger, of Cleveland, representing the Chamber of Commerce; John Kennedy, W. J. Stewart and David Seath, representing the department of marine and fisheries of the Dominion government. A number of United States senators and congressmen were also present.

The present body of water diverted through the drainage canal by means of these two rivers amounts to 4,167 cu. ft. per second, but the city of Chicago now represents that owing to the great increase in its population the diversion is not sufficient for sanitary purposes. It submitted figures to show the volume necessary in order to adequately carry away all sewage. Their argument was based wholly upon the necessity for preserving the health of the citizens of Chicago.

The contention of the lake interests is that the rights of navigation are paramount and that Chicago should seek some other means of sanitation. Their present methods are regarded as antiquated and are no longer practiced in many parts of the world. For instance, filtration is now an accepted practice in many cities, but does not appear to have been given consideration at all in Chicago. Moreover, as was pointed out by William Livingstone, sanitation does not appear to be the sole thing in mind. For instance, he called attention to the fact that the current in the Chicago river is so great that for seven days the steamer Lake Shore was held up in getting to her dock. To repeated applications to lessen the flow of water temporarily in order to get the steamer out of her predicament, the invariable answer was returned that the flow could not be lessened without interfering with the light and power contracts.

Testimony was submitted by Harvey D. Goulder and others showing that the level of the lakes has sensibly fallen since 1900, when the practice of diverting the water first began. The present cycle of low water is 5 or more inches lower than any previous cycle. Mr. Goulder submitted tables showing what this meant to the navigable interests of the lakes. A modern steamer carries approximately 100 tons of cargo on an inch of draught and, therefore, any lessening of available draught at the crossings is a fixed loss in earning power. Moreover, practically every municipality on the lakes has spent great sums of money in developing its harbor, and therefore the wishes of Chicago are not alone to be considered.

Canadian interests are also much concerned over this application and will appear before the secretary of war on March 27 to protest against it. The vessel interests of the lakes are really much concerned over the application and a brief setting forth their reasons for denying it will be filed with the secretary in the near future.

Extinguishing Fire on Ship Board

The problem of extinguishing a fire on ship board as well as preventing one, is a serious matter, because of the usual inaccessibility of most fires which occur in the cargo. Fire has smoldered for days and weeks in a ship's hold while the crew have been unable to put it out; especially so in cargoes of hemp, jute, bituminous coal, and like substances. Steam may damage cargo and under certain conditions may help combustion. The ideal form of extinguisher in an enclosed space like the hold of a ship is a gas which displaces the air by its own specific gravity, and is itself a non-supporter of combustion. This gas is found in sulphur dioxide, made when needed from ordinary commercial sulphur by the Grimm sulphur dioxide machine.

This apparatus for the creation of sulphur dioxide gas consists of a furnace blower and engine and may be installed on ship board or on shore, as needed. Its operation is simple. Air is pumped into the furnace, which is primed with sulphur, and is discharged into a hose or pipe and carried to destination. During the operation the gas is cooled to about the temperature of the atmosphere and leaves the furnace cool, dry and under pressure. It is completely under control so that it may be made of a quality or density to suit a fire extinguishing or fumigating case. This is done in five minutes or less. The pumping apparatus is not brought in contact with the gas, as air *only* is pumped by this method. After the first charge of sulphur, the furnace is fed from the top through a patented device which obviates opening the furnace door and thereby prevents the escape of gas fumes.

The furnace is placed in a water-jacket, which is built on the marine boiler principle, through which water is circulated while in operation and which absorbs all heat of the burning sulphur as well as prevents the possibility of fire by overheating.

In this apparatus there is no deterioration of blowers on account of contact with the gas for air only is pumped.

The use of sulphur for fumigating and disinfecting is too well established to need elaboration.

The apparatus has been approved by the Department of Commerce and Labor (Steamboat Inspection Service), and adopted by American-Hawaiian Steamship Co. after thorough tests.

The company has a barge in New York harbor, equipped with apparatus for fumigating and fire extinguishing uses and can fumigate a ship of say 5,000 tons in a few hours, or put out a fire. The process is known as the Grimm process and further particulars may be obtained from the Fumigating & Fire Extinguishing Co. of America, 29 Broadway, New York.

Graphite on Ship Board

A little booklet, Graphite on Ship Board, has just been published by the Joseph Dixon Crucible Co., and contains some very interesting matter relative to the proper care and maintenance of marine machinery. Interesting articles by Lieut. H. C. Dinger, United States Navy, on the lubrication of marine engines should be read by every marine engineer, as also a short description in regard to the theory of graphite lubrication, its application to general machinery, etc.

This booklet will be sent to any one interested by writing the Joseph Dixon Crucible Co., Jersey City, N. J.

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